The Refrigeration Service Engineer

TECHNOLOGY DEPT.

VOL. 10 NO. 12 ★ ★ ★ DECEMBER 1942

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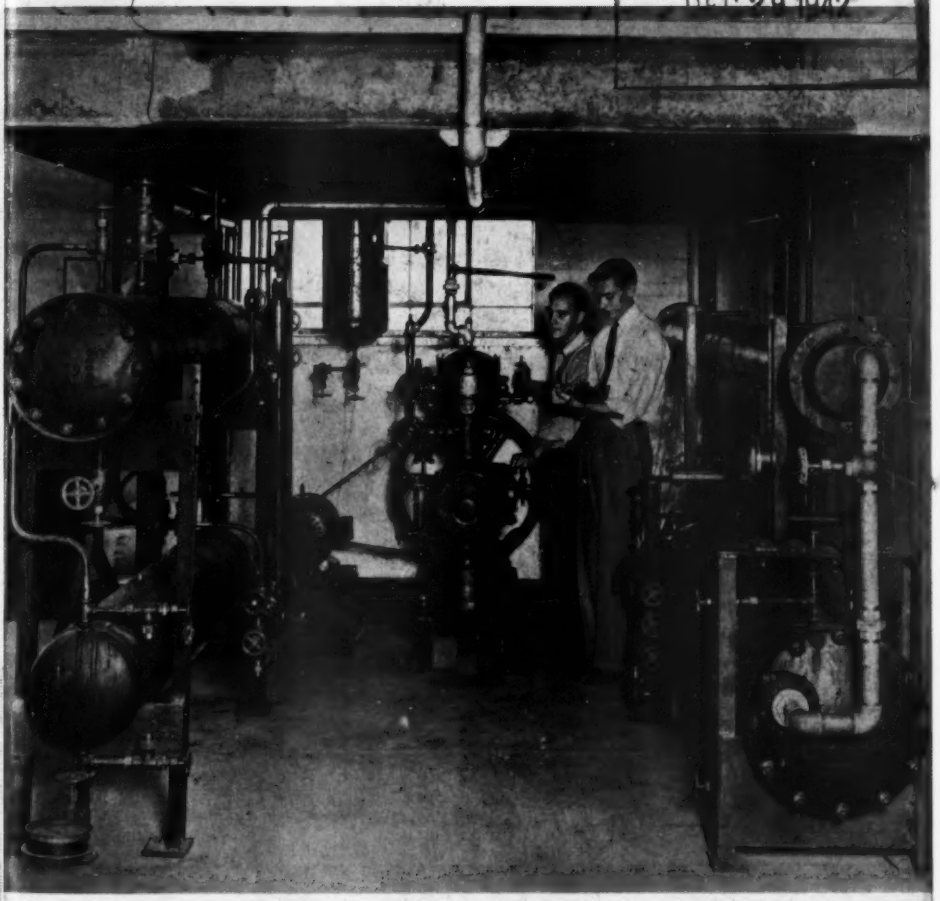


ELECTRICAL WORK AND MOTORS •
WOMEN FILL INDUSTRIAL RANKS •
ALL INDUSTRY COUNCIL FORMED •

We are Delivering the Goods!

Orders from jobbers are repeating, repeating and repeating because you men in the field have demonstrated with an avalanche of orders that you prefer the shaft seal with the Self-Adjusting Sleeve Lock for replacement jobs on household refrigerators.

IT'S ONLY NATURAL THAT YOU WANT THE BEST

Our deliveries to the trade are increasing daily—just as fast as materials are released by the government for fabrication. We appreciate the patience everyone in the trade has shown us in regard to our efforts to speed up deliveries in the face of a shortage of materials due to the war.

However, that is now water over the dam. Here is the good news you have been waiting to hear: *Your jobber NOW has Chicago Seals or can get them for you.*

Refrigeration Engineers Are the Conservators of the Nation's Food Supply

Chicago Seals

CHICAGO SEAL CO. 20 North Wacker Drive CHICAGO, ILLINOIS

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago, Ill. Published monthly. Vol. 10, No. 12, December, 1942. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in United States, $2.00 per year; all other countries, $3.00 per year.

Holiday Greetings

TO OLD FRIENDS AND NEW

Your purchases of War Bonds will help speed the coming of Victory which will bring

PEACE ON EARTH AND GOOD WILL TOWARD MEN

ANSUL CHEMICAL COMPANY

SULPHUR DIOXIDE...ICE-X
METHYL CHLORIDE

MARINETTE • WISCONSIN

It's Time to Tell About Refrigeration's *"Hidden Services"*

..take fluid MILK

★ ★ ★ ★ ★ ★

★ ★ ★ ★ ★ ★

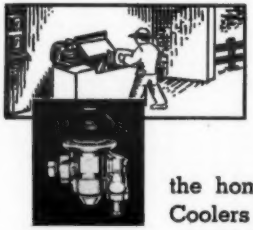
for instance..

Today, twenty million mothers reached out [illegible] of cool, fresh, pasteurized Milk — prized body-building and health-giving nutriment

At the Dai[illegible], after it is stored [illegible] large refrigerated rooms, and just before

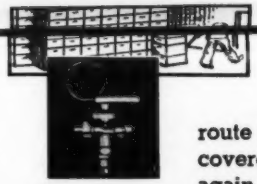
Today twenty million mothers reached out for a bottle of cool, fresh, pasteurized Milk — prized body-building and health-giving nutriment for growing or working Americans.

But the Role Refrigeration Played in That Delivered Milk Was a *"Hidden Service"*



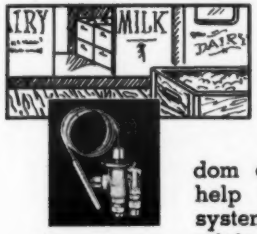
MODEL 204
Automatic
Expansion Valve

Yet Refrigeration started protecting that Milk before it left the farm—and kept right on the job until it reached the home Refrigerator. Milk Coolers on the Farm took the animal heat out of the Milk and had it ready for the Insulated Trucks that delivered it to the Dairy.



MODEL 215
Thermostatic
Expansion Valve

At the Dairy, after it is stored in large refrigerated rooms, and just before loading on the route wagons, each case is covered with fine ice. This again is a mechanical refrigeration job — "hidden service" that reaches every phase of living.



MODEL 205
Thermostatic
Expansion Valve

A-P DEPENDABLE REFRIGERANT VALVES are "in" on every phase of Refrigeration. Rarely seen, seldom even touched, they help keep Refrigeration systems running with a minimum of attention, certainly a very important point due to our increasing manpower shortage.

AUTOMATIC PRODUCTS COMPANY
2450 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN
Export Department
100 Varick Street . . New York City

AP DEPENDABLE Refrigerant Valves

A Rough Idea of HELL

....by a Marine who just came back

"I don't know what a Marine just returned from the Solomons is supposed to talk about on this the one-hundred-and-sixty-seventh anniversary of the Corps. But I *do* know what *this* Marine has been itching to say and to talk about. It may be hard for you to realize it... sitting there in the quiet and peace of your home... but all Hell's broken loose all over the world. I know, because I've just come back from it.

"And it isn't any pretty picture I want to trace for you, but a nasty, dirty, bloody picture.

"And don't think for a minute... just because America's homes are thousands of miles away from actual combat... that they're not a part of this picture.

"You know, throughout the generations artists have tried to draw a picture of Hell. Well, Tulagi would have given them a rough idea... a very rough idea... of what Hell is like It's a crazy, seething inferno of the flames of bombed ammunition dumps and it's the black, choking smoke of shelled gasoline tanks... it's more noise than you ever thought there could be on earth... with paths of tracer bullets to etch the picture of Hell right into your mind. That was Tulagi!

"Y'know, it's pretty funny to me to hear anyone worrying about getting only one cup of coffee a day... with a picture of wounds, right down to the muscle and bone, still staring me in the face.

"There was Major Ken Bailey. He was shot clean through the leg at Tulagi. And I mean *through*... although it wasn't so very clean... and he was sent back for repairs and then ordered home.

"But Ken wasn't through. He knew that those Japs meant business and that they didn't like us English-speaking folks even a little bit. So he... as much as any good Marine could do... told his commanding officer he was going back in the fight instead of coming home.

" 'Okay,' said the skipper. 'If that's the way you feel about it... go on back.' And that *was* the way Ken felt and he went back in again. And he was wounded again. This time it was a wound in the skull. And he went back. And then... wounded a third time... he *died*.

"Guys like Ken Bailey don't ride into battle, through Jap-infested jungles, on a ration of gasoline.

"They go back on their own two legs... or their one-and-a-half legs. Ken Bailey isn't an exception. He's typical. There are thousands like him.

"They've seen and felt war... yes... and tasted it... until it spewed right out of their lips... and they died.

"They know the Japanese are tough, shrewd, game, tricky, fierce fighters who want to wipe out America... and they fully expect to do it, too.

"And... unless every one of us knuckles down and pulls in his belt... they will!

"There can't be quibbling about *making* a rifle here in America any more than there can be any quibbling about *using* one out there in the Pacific.

"You've got to aim straight and sure right here in every town and village and city in America... just as sure as

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This speech is printed with the permission of the United States Marine Corps. It was originally broadcast from the Quantico Marine Base by Major Justice M. Chambers, U. S. M. C., on the radio program of E. R. Squibb & Sons on November 9, 1942 • Artwork, courtesy U. S. Marine Corps

every Marine expert rifleman has to aim and fire when he sees a horde of green-uniformed Japs coming toward him in a sweltering, disease-ridden jungle.

"It means that everyone has to live strict, straight, efficient and scrimping lives *beginning* right *now* in America ... or you won't have any lives to live ever again. No, and we won't have *America* either. Maybe some of you know all these things. If you do, tell your neighbors about them ... and keep on telling them ... tell them till they get mad at you. Maybe, after a while, they'll get mad at those Japs and all the rest of that rat-infested gang that want to eat away the civilization we've built up for ourselves and our children. And if you young fellows listening at home like that home of yours and are made of the right stuff ... don't think the United States Marine Corps doesn't need you! 'Cause it does.

"This is the greatest, toughest war America has ever been up against and everybody has to snap out of it right now and forget about the old peace-time ways of living and thinking. The longer it takes every American to do *that* the longer this war is going to last ... and the closer we're going to come to losing it. Ken Bailey wouldn't like that ... one little bit! And my old skipper, Colonel Merritt Edson and the men who are listening somewhere out there in the Pacific, I know they're agreeing with every word I've said.

"Good hunting, gang ... and good luck!"

★

We are reproducing in printed form a fighting speech by a fighting Marine because we believe it carries an important message to every manufacturer, jobber, contractor and service man. Surely no sacrifice we may be called upon to make is too great, if we can keep the fighting front supplied with everything it needs to win the war.

HENRY VALVE COMPANY

1001-1019 NORTH SPAULDING AVENUE • CHICAGO

PACKLESS AND PACKED VALVES • STRAINERS • DRYERS FOR REFRIGERATION AND AIR CONDITIONING
AMMONIA VALVES • FORGED STEEL VALVES AND FITTINGS FOR OIL, STEAM AND OTHER FLUIDS

COOPERATION WINS THE WAR

WOLVERINE SALUTES

THE TEN WINNERS

In recognition of their noteworthy contributions to the war effort, ten men were invited to the White House on December 10 to receive individual awards personally bestowed on them by President Roosevelt.

In this ceremony, the first of its kind in the country's history, six of the workers, chosen from the war industries in cooperation with local labor-management committees, received Citations of Individual Production Merit, signed by Donald M. Nelson; and the four other workers received Certificate Awards.

Wolverine's salute to these men carries a deep feeling of pardonable pride because among them is one of our own men, Walter P. Hill, a member of the American Society Refrigeration Engineers, whose development of a new process of manufacturing primer tubes is now used in the firing mechanism of millions of large shells. Through his untiring efforts many worthwhile savings in critical materials have been effected, and great reductions have also been made in man-hours and machine time.

WALTER P. HILL
"Production Soldier"

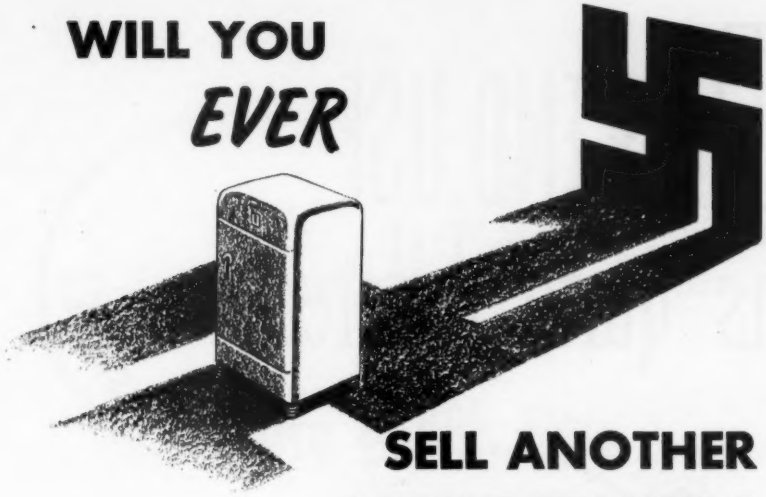
The Citation Award winners, in addition to Hill, are: Joseph H. Kautsky, Link-Belt Co.; Clinton R. Hanna, Westinghouse Electric and Mfg. Co.; Edwin Curtiss Tracy, RCA Manufacturing Co.; Madison E. Butler, Stromberg-Carlson Telephone Mfg. Co.; and James A. Merrill, Goodyear Tire and Rubber Co.

Certificate Awards went to George Smolarek, Packard Motor Car Co.; Daniel Walter Mallett, Borg-Warner Corp.; Herbert Ruper James, National Tube Co.; and Stanley Crawford, RCA Manufacturing Co.

Men, you've done it! We're proud of you, and we are happy in the thought that you are receiving the public recognition you deserve. We hope your achievements will serve as stimulants to even greater employee participation in factory suggestion-box system, where more good ideas may be born and mature into helpful devices that will bring us an early peace.

WOLVERINE TUBE DIVISION
OF CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
Seamless COPPER • BRASS
1419 CENTRAL AVENUE • DETROIT, MICHIGAN

WILL YOU *EVER* SELL ANOTHER REFRIGERATOR?



SHADOWS of oppression across the world can't obscure the white light of hope kindled by America's capacity to produce. *Right*, backed by production *might*, must in the end prevail.

When that happy ending comes, the fogs of doubt will lift over both your refrigerator market and your sources of supply. Meanwhile, you can perform a needed service by keeping present units in repair, so that they will last for the duration. We at Tecumseh Products are still manufacturing units, but they are only for our Army and Navy and essential civilian needs. Your contribution to conservation—by keeping in repair America's refrigeration plant and thus prolonging its life—serves the national interest, profitably and patriotically.

TECUMSEH PRODUCTS CO. TECUMSEH MICHIGAN

Chieftain

Their END USE is quite different

BUT THEIR JOB IS STILL THE SAME!

We proudly fly the Victory Fleet Flag and distinguished Maritime "M" Burgee awarded for outstanding maritime production efficiency by the United States Maritime Commission.

TODAY

KEROTEST VALVES AND FITTINGS

ARE DEPENDABLY CONTROLLING AIR CONDITIONING AND REFRIGERATION EQUIPMENT IN

WAR PLANTS — NAVAL BASES
SHIPYARDS — HOSPITALS
ARMY CANTONMENTS

AND NUMEROUS OTHER WAR-TIME ACTIVITIES WHERE FRONT LINE OR INDUSTRIAL SOLDIERS MUST BE PROTECTED

KEROTEST

KEROTEST MANUFACTURING COMPANY

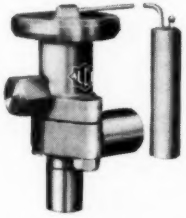
PITTSBURGH, PENNSYLVANIA

Proper Installation Assures Even Longer Life for Every ALCO THERMO VALVE

Traditionally, Alco Thermo Valves have been widely known for their exceptionally long life. Today, however, under wartime production restrictions, it is essential that proper precautions be taken to increase the usual life of Thermo Valves on your equipment and installations.

These installation and maintenance suggestions will help you to keep Alco Thermo Valves in service longer, and at maximum efficiency.

THERMO VALVES



1. It is always advisable to install filters ahead of the valves.

2. Be careful not to install the remote bulb in a location subject to heat or unusual ambient temperatures. Such positions may injure the diaphragm, or when the system is operating, cause the valve to remain constantly open. A slightly open valve exposes pin and seat to excessive wear and erosion due to high gas velocity.

3. Do not install the remote bulb so as to expose it to a downstream of air. In such locations it does not accurately reflect the temperature in the suction gas leaving the evaporator.

4. Be careful to install the correct size of Thermo Valve. Oversize valves result in costly wear on valve pin and seat.

These service tips from Alco are published in the interest of refrigeration conservation and maintenance. Until such a time as replacements are again easily available for ordinary civilian uses, it is essential that every effort be made to keep existing equipment operating in the most efficient manner possible.

ALCO VALVE COMPANY

2630 Big Bend Blvd. St. Louis, Missouri

ALCO *Engineered Refrigerant Controls*

THE STANDARD OF THE INDUSTRY

A Safe Food Supply for Our Nation at War!

In homes, in food warehouses and in markets all over the country, millions of Ranco Refrigeration Controls are on duty night and day vigilantly safeguarding one of America's most important assets.

The production of Ranco Refrigeration Controls is limited to essential requirements for dependable protection of the Nation's Food Supply.

Ranco INC.
COLUMBUS. OHIO

The Refrigeration Service Engineer

Vol. 10 No. 12

December, 1942

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

View of a refrigeration plant which utilizes welding in ammonia piping system. Designed for use in college laboratory and equipped with devices for measuring quantities. See article on page 40.

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KEEP 'EM RUNNING

THE old story of "a stitch in time" never had greater application than today... so important is the need for keeping all existing equipment running.

While practically 100% of Weatherhead facilities are devoted to production for Victory, we appreciate the fact that the home front is vital also, and as far as possible we are supplying this front with parts, fittings and accessories—to keep refrigeration equipment running. Call on us for what you need. We cannot make long-range promises, but will do our best to take care of your requirements.

THE WEATHERHEAD CO.
300 East 131st Street
Cleveland, Ohio

WEATHERHEAD

Refrigeration Valves, Fittings and Accessories

The Refrigeration Service Engineer

Vol. 10, No. 12 CHICAGO, DECEMBER, 1942 $2.00 Per Annum

Electrical Work and Motors

FOR an adequate understanding of electrical principles involved in refrigeration and electric motors it is necessary to know how an electric circuit is made and how it operates. For a quick understanding it might be said that an electric circuit may be compared to the flow of water through pipes.

A water pump which raises pressure on the water as it passes through the pump is shown in Fig. 1. As shown in this diagram, the water comes into the pump at a low

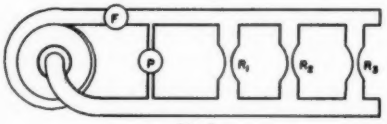

Fig. 1

pressure, leaves the pump at a high pressure, and then passes on where the pressure is reduced in another part of the system and the water is returned to the inlet of the pump. In this diagram, F represents a flow meter which measures the quantity of water flowing through the pipes in a given time. To measure the rate of flow, it must be installed in the pipe itself and all the water which passes through it must be measured.

A gauge which shows the difference in pressure prevailing between the high pressure and the low pressure part of the system is shown at P. Being a differential pressure gauge it must have connections to both the high and the low pressure sides of the system. Restrictions to the flow of water are illustrated by the parts of the system marked R_1, R_2 and R_3. The size of opening and the length of the pipe, of course, determines the restriction on the flow of water, and the smaller the pipe diameter and the longer the pipe, the greater the resistance to the flow of water will be.

Let us suppose that R_1 has one unit of resistance to the flow of water. We will assume that one unit of resistance to the flow of water is the amount of resistance requiring a difference in pressure of one pound per square inch across the resistance in order to push one cubic foot per minute through the pipe. Then let us suppose that R_2 is twice this resistance, or two units, and that R_3 is three units of resistance. Let us suppose, also, that in this case there is a difference in pressure between the high and low pressure sides of the system of 110 lbs. per sq. in. Then the quantity of water that will flow through the resistance R_1 will be equal to the difference in pressure divided by the number of units of resistance. Thus the quantity of water flowing through R_1 will be:

$$Q = \frac{110}{1} = 110 \text{ g.p.m.}$$

The quantity of water flowing through the second resistance will be:

$$Q = \frac{110}{2} = 55 \text{ g.p.m.}$$

The quantity of water flowing through the third resistance will be:

$$Q = \frac{110}{3} = 37 \text{ g.p.m. (approx.)}$$

The total quantity of water circulating in the system then will be the sum of these three quantities, or:

$$110 + 55 + 37 = 202$$

The total resistance to the flow of water then is considerably less than the resistance of any one resistance alone because that resistance can be determined by dividing the pressure difference by the quantity of water which passes from the high pressure side to the low pressure side of the system. The combined resistance of these three resistances then will be:

$$R = \frac{110}{202} = .545$$

In a problem of this kind, to determine the effective resistance of these three resistances, the general formula used is as follows:

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Thus we have

$$\frac{1}{R} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} = \frac{6}{6} + \frac{3}{6} + \frac{2}{6} = \frac{11}{6}$$

$$\text{Since } \frac{1}{3} = \frac{1}{6}, R = \frac{6}{11} = .545$$

The quantity of water to be passed through this resistance then would be as follows:

$$Q = \frac{110}{.545} = 202$$

By ascertaining how much water went through each resistance and then adding these quantities together, the above will be shown to be true.

In Fig. 2 an electrical circuit is shown which includes a generator or battery used to raise the electrical pressure. The rate of current flow is measured by an ammeter, device A. The difference in electrical pressure between the inlet and outlet sides of the generator or battery is measured by a voltmeter device V. R_1, R_2 and R_3 are resistances. In any such electrical circuit, Ohm's law is a formula commonly used which states that the voltage is equal to the current volt in amperes times the resistance in ohms. An ohm is that resistance to an electric current which will cause a drop in pressure of one volt for each ampere of current passing through the resistance. If the voltage in this circuit was 110 volts and R_1 was one ohm, R_2 two ohms, and R_3 three ohms, we would have an electrical system comparable to the circulating water system shown in Fig. 1. The number of amperes then registered by the ammeter would be 202 and the formula for finding the combined resistance of these resistances in parallel would be:

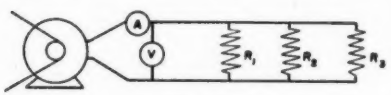

Fig. 2

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} = \frac{11}{6}$$

$$R = \frac{6}{11} = .545$$

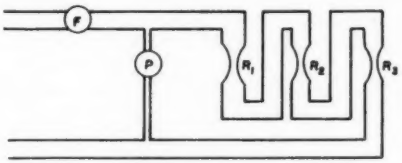

Fig. 3

Shown in Fig. 3 is a water circulating system which has three resistance units in series; the water which passes through one must also pass through the other resistances. In this case we will assume that there is a difference in pressure between the high pressure and low pressure lines of 110 lbs. per sq. in., and also that the resistance R_1, R_2 and R_3 are the same as those in Fig. 1. Since these resistances are in series, we do not have the total drop in pressure over any one resistance since the total drop in pressure, 110 lbs. per sq. in., occurs over all the resistances in series. In the first case, there is one unit of resistance; in the second case, two; and in the third case, three units of resistance. In series these resistances are

cumulative, the total being six units, R_1 being 1/6, R_2 being 1/3, and R_3, 1/2 of the total resistance. Thus R_1 will require 1/6 of the drop in pressure to push the quantity of water through the resistance. One-sixth of 110 would be 18⅓ lbs. per sq. in., and this would push through the following quantity of water:

$$Q = \frac{18\frac{1}{3}}{1} = 18\frac{1}{3} \text{ g.p.m.}$$

In the second case the drop in pressure would be 1/3 of 110, or 36⅔ lbs. per sq. in., and this drop in pressure would cause the following quantity of water to flow:

$$Q = \frac{36\frac{2}{3}}{2} = 18\frac{1}{3} \text{ g.p.m.}$$

In the third case there would be a drop in pressure of 1/2 of the total, or 55 lbs. per sq. in., and in this case the flow would be:

$$Q = \frac{55}{3} = 18\frac{1}{3}$$

In this series circuit there is 18⅓ gals. per minute flow through these three resistances in series, with a small drop in pressure by the first one, a greater drop by the second, and one-half of the total drop in pressure by the third. The combined resistances are:

$$R = R_1 + R_2 + R_3 \text{ or}$$
$$R = 1 + 2 + 3 = 6$$

The quantity of water flow through this circuit is:

$$Q = \frac{110}{R} = \frac{110}{6} = 18\frac{1}{3} \text{ g.p.m.}$$

The corresponding electrical circuit with the resistances R_1, R_2 and R_3 in series is shown in Fig. 4. In this case the total resistances of the water is:

$$R = R_1 + R_2 + R_3$$

In Figs. 1 and 3, if a valve in the suction or discharge lines to the pump is closed, the flow of water would be stopped. If a valve in one branch of the circuit shown in Fig. 1 is closed, the flow of water would be stopped through that one branch only. In an electric circuit, an opening in the line corresponds to closing a valve in a water circuit. An open line in an electrical circuit stops the flow of the electrical current entirely. In any series circuit such as shown in Figs. 3 and 4, a valve in the water circuit or a switch in an electrical circuit could be used to stop the flow of water or electricity completely. These explanations apply to the direct circulation of water or direct circulation of electricity known as direct current. Electrical work, however, to a large extent has to do with alternating current electricity.

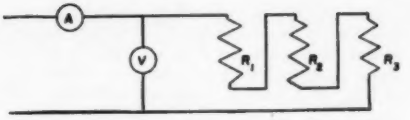

Fig. 4

An analogy through an alternating current electrical system is shown in Fig. 5. In this diagram the device G, which consists of a cylinder and a piston, corresponds to the generator in an alternating current system. The device M corresponds to the motor in an alternating current refrigerating system, and the reciprocating motion in the piston of G causes the pressure recorded by the differential pressure meter, V, to become alternately higher at A than B, and higher at B than at A. Energy is transferred from the piston in G to the piston in M, thereby causing a reciprocating motion in M which may be connected to a crosshead and flywheel, thus creating power which may be taken from the motor, M.

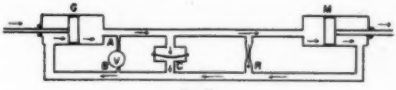

Fig. 5

The device C is similar to an electrical condenser. In the water system it consists of a container with a flexible diaphragm, and since the pressure at A is higher than at B, the diaphragm bends, forcing a small quantity of water through the container, and as the pressure at B becomes higher than at A, due to the piston in G going in the opposite direction, the diaphragm bends in the other direction and water passes out of the container in the opposite direction, thus creating a flow of water back and forth through the pipes. The area of the diaphragm and the difference in pressure which causes it to bend, determines the quantity of water that will pass back and forth through the pipe connected to the container. In the electrical condenser, the quantity of electricity passing through the lines depends upon the capacity of the condenser and the difference in voltage. The branch circuit connected to R and resistant to the flow of water merely allows some water to pass through the resistance, first in one direction and then in the other, depending on whether the pressure at A is higher than the pressure at B.

The method of connecting up two sets of coils in a common type of refrigeration motor is shown in Fig. 6. The hookup, when using this type of motor on a 110-volt circuit, is shown in Fig. 6a, and Fig. 6b shows the hookup for a 220-volt circuit. In either case the amount of power is the

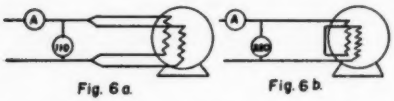

Fig. 6a. Fig. 6b.

same. In the first case, we will suppose that each coil has a resistance of 10 ohms in itself. With the two coils in parallel the combined resistance will be:

$$\frac{1}{R} = \frac{1}{10} + \frac{1}{10} = \frac{2}{10} \text{ and}$$

$$R = \frac{10}{2} = 5 \text{ ohms}$$

Thus the amount of current measured by the ammeter A will be:

$$A = \frac{110}{5} = 22 \text{ amperes}$$

This is equally divided between the two coils, so that 11 amperes will be passed through each coil.

In Fig. 6b, it is a 220-volt circuit and the two coils are in series. The resistance in these two coils in series will be:

$$R = 10 \quad 10 = 20$$

$$\text{In which case } A = \frac{220}{20} = 11 \text{ amperes}$$

Thus in 6b, the current measured by the ammeter will be 11 amperes, but this will pass through both coils so that the amount of current in each coil will be the same as in 6a. However, the line which supplies the motor passes only ½ the current but at twice the electrical pressure. The power used for pure resistance circuits is measured in watts and is equal to the current flow in amperes times the electrical pressure in volts.

In the first case: Watts = 22 amperes × 110 volts = 2,420 watts.

In the second case: Watts = 11 amperes × 220 volts = 2,420 watts.

In both the hookups, 6a and 6b, it will be noted the current passes through both coils in the same direction. If one coil were reversed with respect to the other, it would have the effect of making one set of coils neutralize the effect of the other set, and a motor hooked up in this manner would hum but would not start.

A simple electrical hookup used in connection with an electric refrigerating system is shown in Fig. 7. As shown, it is connected to a wiring system which has only two entrance wires, one of which is a white wire and the other a black wire. This type of electrical wiring is found in many residences, the white wire being referred to as the neutral or ground wire, and the black wire referred to as the hot wire. A test lamp connected from the black wire through a light and to a water pipe or any other good ground would show a light of normal intensity, while a test lamp connected to the white wire and ground would not show any voltage or any light. The white wire has the same electrical pressure as the water pipe or ground wire in the building.

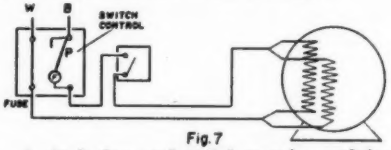

Fig. 7

A single fuse and switch may be used for a small system such as described here. The single fuse switch should be connected so that the black wire is in series with the switch, the fuse, the control, through the motor, and return to the white side of the line. It should also be connected so that when the switch is opened, the fuse is not connected in any way to the hot line. This would not be the case if the black and white wire leads to the switch were reversed; the fuse would be connected to the hot wire through the control and motor when the switch was open. Also, if the lines leading to the switch were attached at the bottom and left at the top, the fuse would be alive at all times and the blade of the switch would also be alive, and this would not be the correct way to connect such a switch. In this system, the electrical circuit can be traced out from the black wire through the switch when the switch is closed; through the fuse; through the control if it is closed, then through the motor, back to the white wire. If the control, the switch or the fuse are open, the circuit is incomplete and there will be no electric current. This electrical system, comprising one white and black wire, is always 110 volts, that being the difference in electrical pressure between the two wires. This is true for either a direct current or alternating current system.

(To Be Continued in January Issue)

San Antonio Refrigeration Manufacturer Replaces Men with Women Workers

By Robert Latimer

THE question of whether or not women will be able to take over the "tough" jobs in refrigeration manufacturing to replace men is being answered at the Ed Friedrichs, Inc., refrigeration plant at San Antonio, Tex., which recently replaced seventy men employes with women.

At present manufacturing almost 100 per cent commercial refrigeration equipment for the armed forces, the Friedrichs concern took up the employment shortage problem several months ago—experimenting with many changes such as switching men from one job to another as they desired, hiring older retired veterans, etc. This sufficed until September, when enlistments and the draft made it impossible to keep up vital military production without drastic personnel policy changes.

Satisfactory in Production

Until five weeks ago, no woman had ever been employed in the Friedrichs factory except a few secretaries in the business offices. Now there are seventy women on the production lines, all proving highly satisfactory and in some instances even superior to men, according to A. R. Kinley, personnel manager for the Texas refrigeration firm. They are handling every job from turning lathes in the Friedrichs mill room to assembling complete electric motors for refrigeration systems of all tonnages. All are wearing neat coveralls without sleeves or baggy pockets to catch in machinery, or slacks and tight blouses with short sleeves. Using drill presses, ripsaws, molders, automatic screw drivers, etc, they have been meeting production schedules without an accident to date.

"We've found that carefully selected young women stack up equally well with men," Mr. Kinley explained. "the average girl learns more rapidly since she is more used to doing small things with her hands. Even simple tasks such as washing dishes, running the family sewing machine, operating an electric mixer, etc., fundamentally helps in turning lathes, connecting motors and refrigeration coils. Women have shown a surprising interest in the basic principles of refrigeration we hadn't expected, and are quick to grasp the efficiency points of their jobs."

Physical aptitude counts heavily in selection of women employes, according to Friedrichs. Women on the lines must stoke cutting machines with large sections of lumber involving lifting and coordination, sit cramped up inside a refrigerator while fitting parts, scrubbing and painting away for hours on newly finished boxes. "Our women employes were chosen for their stamina as well as mental qualifications," Mr. Kinley added. "They are capable of extended hours of careful work as well as men and frequently show less fatigue. We have attempted to meet the work-fatigue problem by instituting frequent rest periods, encouraging girls to begin resting before they become tired, and giving them the right to rest a few minutes at any time. We have also outfitted a recreation room on our second floor which allows the girls to have a cold drink and a cigarette comfortably, or to lunch together at small tables. Ping pong and other amusement will be provided as soon as the materials can be obtained."

Women Suited to Work

It is no accident that the feminine production workers at the Friedrichs plant (which holds contracts for supplying hundreds of mess halls, warehouses and quartermaster procurement offices with durable refrigeration) are physically and temperamentally suited to their work. Mr. Kinley hand picked each one, finding each girl for the right job on the basis of how she handles herself in general. Endless patience and keen discrimination are essential. Mr. Kinley advises first noting the girl's attitude as she fills out her application blank, how long it takes her, how she responds to questions and suggestions, and how she uses her hands. Deftness and ability to adapt herself to a

complicated blank count heavily. When the applicant walks down the stairs after an interview, Mr. Kinley has a concrete idea of how well she will fit into the organization.

Most of the girls, even those handling more highly complicated work on motors, confess that before coming to the Friedrichs plant, they did not know that they possessed mechanical aptitude of any kind. Native good sense, good health, fine coordination and above average finger skill have all been turned to good account.

"In Plant Trainees"

Besides taking women into the plant, Friedrichs, Inc. has made another innovation show good results—accepting what are known as "in plant trainees" for several hours a day from girls who have been working on WPA projects in San Antonio and surrounding Texas towns. Native good sense, good health, fine coordination and above average finger skill are usually discovered in this bracket. Girls work 160 hours in the plant, being paid by WPA for the time with the understanding that after that time they will be put on the company payroll if their work is satisfactory. If not satisfactory, the girls can return to the WPA projects.

Those taking "in plant" training are doing excellent work, according to Mr. Kinley. Among those taken in from regular employment channels are army wives, wives of civil service employes at Duncan Field and at defence plants throughout the area. With the exception of the few girls brought out of the WPA ranks, not one member of the staff has worked at anything other than housewife for the past ten years. "We considered the experiment worthwhile in view of the circumstances in all industry," Mr. Kinley summed up, "and find that with careful selection, it will be possible to run our plant with 100 per cent feminine help if the war makes this necessary."

S S S

Pvt. Howard M. Wood
Concho Field, Tex.

Just a line to yet you know that I enlisted in the Army Air Corps last September. You may continue to send REFRIGERATION SERVICE ENGINEER to my office and some of these days, when it is all over, I'll be back to enjoy all the refrigeration news. Have been assigned to the Photo Lab here and like it very much.

SCHOOL WILL TRAIN SOLDIERS IN REFRIGERATION SERVICE

ANNOUNCEMENT is made of the founding of the Commercial Trades Institute organized for the purpose of training enlisted men of the United States Army in refrigeration maintenance and mechanics. The Institute's training center will be located at 407 West Washington Street, Bloomington, Ill. Executive Offices are maintained at 221 North LaSalle Street, Chicago, Ill.

The school will operate under a contract with the Quartermaster Corps, executed by the 6th Service Command and will have several hundred soldiers in attendance at all times for twelve week periods.

The course will be devoted to an extensive study of the various leading makes of domestic and commercial units used by the army. As is generally well known, our armed forces are depending more and more on adequate refrigeration service for a number of needs. This tremendous increase in the use of mechanical refrigeration equipment results in an urgent demand for well-trained service men. It is in the interest of this cause that the Commercial Trades Institute was founded.

The President of the organization is R. E. Tucker and School Manager, R. C. Anderson. Entrusted with the supervision of instruction is N. R. Newman, formerly of New York State University and at one time New York State Service Manager for Norge and R. L. Hendrickson, past secretary of the Educational committee of the Refrigeration Service Engineers Society and well known in refrigeration circles.

The first contingent of soldiers is due to arrive in Bloomington on January 4. The Institute has also arranged for the quartering and feeding of the men during their training period.

So far as is known this is the first private school authorized by the War Department for instruction in Refrigeration service. The entire staff has had years of experience in trade school work and intends to leave no stone unturned in making a first class service man but of each enrollee.

S S S

A 37-millimeter anti-aircraft gun uses a ton of copper every 20 minutes it is in operation. Six hundred pounds of copper go into every medium tank and a ton into the engines and air frame of a flying fortress.

Refrigeration Industries Form Council for Joint Action with Government and on Industry Problems

PRELIMINARY steps were taken to form an All Industry Council of the Refrigeration and Air Conditioning Industry at a joint meeting held November 19 and 20 in the Palmer House, Chicago. The conference was arranged by the Refrigeration Equipment Manufacturers Association and was an expansion of the regular fall meeting of that group. The Refrigeration Service Engineers Society and the National Refrigeration Supply Jobbers Association, upon receiving invitations participated by sending sizable delegations, headed by President E. A. Plesskott of the engineers and President Alex Holcombe, Jr., of the jobbers.

The President and Secretary of each of the refrigeration organizations represented at the conference attended a dinner held on the evening of November 20, during the closing hours of the meeting and it was here that the first steps were taken toward the formation of an All Industry Council.

Membership in the Council was arranged to consist of one voting member and one alternate from each group. The objectives were stated as (1): To offer the cooperation of our entire industry to the Government. (2) To act as a clearing house on industry problems. (3) To engage in a public relations program to point out the important part which the refrigeration and air conditioning industry plays in the life of our country, and its importance to public health.

The organizations represented at this evening meeting were the Commercial Refrigerator Manufacturers Association, the National Refrigeration Supply Jobbers Association, the Standard Refrigeration Compressor Association, the Refrigeration Equipment Manufacturers Association and the Refrigeration Service Engineers Society. Telegrams requesting participation in the Council were sent to the Air Conditioning and Refrigeration Machinery Association, the National Frozen Food Locker Association, and the American Society of Refrigerating Engineers.

Arrangements were made for a meeting to be held at New York City, December 3, at which the hope was expressed that the President of each of these organizations forming the Council, or his alternate, would appear to discuss further plans. President Plesskott appointed Charles C. E. Harris, of Cambridge, Mass., to attend the meeting as his alternate to represent the Refrigeration Service Engineers Society.

Opening of Conference

The two days occupied by the All Industry Conference in the Palmer House, Chicago, were well filled with productive group meetings and interesting addresses. With President John Wyllie, of the Refrigeration Equipment Manufacturers Association, in the chair, the conference got under way on the morning of November 19 promptly at 10:00 A. M. Mr. Wyllie delivered his address of welcome, outlining the purpose of the conference. He was followed by Edward P. Wells, Chicago Metropolitan Office, O. P. A., who explained the price policies of his department. K. M. Newcum, Vice-president and Sales Manager of the Superior Valve & Fittings Co., Pittsburgh, delivered an excellent address entitled "Are You Making the Best Use of Priorities?"

Making Best Use of Priorities

Mr. Newcum pointed out that Preference Rating Orders No. P-100 and No. P-126 are the only orders applicable to material for maintenance and repair of refrigeration and air conditioning equipment. He expressed hope that P-126, now being revised, will offer higher ratings. He touched on the misuse and abuse of both orders. Most violations, he said, have been the result of mistaken opinion. Violations in the future may be made the object of stricter check-up and perhaps punishment. Maintenance and repair, as defined, means the replacement of parts which are required to put the system

back in sound operating condition. The purchase of materials, allegedly for maintenance and repair, but really for installation and inventory, is wrong.

"If, in revamping P-126," said Mr. Newcum, "higher ratings are made available, then each authorized service agency should feel a deep sense of responsibility to WPB officials to see to it that the privileges under the order are not abused by applying the ratings where they are not applicable."

Dr. J. Raymond Schutz, of the Standard Life Insurance Co. of Indiana, received a standing ovation at the end of his address on "Democracy or Slavery." He had little to say about refrigeration, but he talked in most interesting vein on the war and the opposing democratic and totalitarian concepts of life.

"Hitler has said that the world is not big enough to hold both of the concepts," said Dr. Schutz, "and for once we can agree with him. One of them must de destroyed and we are determined that it shall be totalitarianism."

The afternoon of the first day was devoted to a closed meeting of the National Refrigeration Supply Jobbers Association and to various group meetings. The morning of November 20 was given over to a closed meeting of the Refrigeration Equipment Manufacturers Association.

At the afternoon session President E. A. Plesskott, of the Refrigeration Service Engineers Society, delivered a well received address entitled "The Service Engineer Tells His Problem on the Subject of Maintenance and Repair of Existing Refrigeration Equipment." His talk follows in part:

President Plesskott's Address

Taking the broad view, the dilemma of the service men has two horns. One of these horns is manpower; the other is replacement parts. Both are caused by war, and while the help which may be given to us can furnish relief, we know well enough that no complete cure for our twin troubles can come with anything short of peace with victory.

Since the start of the war the ranks of the refrigeration service engineers have lost a large number of valued workers. Many have entered military service, including our Secretary, H. T. McDermott, who is now overseas in one of the hot spots. We have lost some men to the factories engaged in direct war production. Replacing these men from the outside has been most difficult. At the same time the normal amount of service work which our members are called upon to perform has increased tremendously. The situation is serious now and will be worse next year. We must do *more* work with *fewer* skilled, experienced men within our ranks.

We believe that refrigeration service engineers can best help to win the war by staying on the job. We can picture, not later than the start of next summer, a more or less complete breakdown of mechanical refrigeration, due to shortage of replacement parts and of trained men for repair and maintenance work. Epidemics of food poisoning, striking down persons all over the nation must be prevented and the only way that they can be prevented is for the Government to make available, somehow, enough replacements parts to keep the nation's essential refrigeration in operation, and to make it possible for us to keep on the job enough trained and experienced refrigeration service engineers to do the work of repair and maintenance of existing equipment.

We must distinguish between what is "essential" and what is "convenient." This is no time for frills. Refrigeration and air conditioning for *comfort* can wait for the day of victory. When I used the word *refrigeration* I am talking about refrigeration for the preservation of food, in order that our men with guns, and the men behind the men with guns, may continue to have wholesome nourishment. I am talking about refrigeration which is *essential,* and I am not even *thinking* about anything else.

Because I want America to win this war more than I want anything in the world, I am going to ask the draft boards of the Selective Service System whether a trained, experienced referigeration service engineer can be of greater service in winning the war by being inducted into the Army or by staying on the job of refrigeration repair and maintenance which is so essential to the success of our military effort.

In the work they are now doing our refrigeration service engineers are trained and experienced. You see, when a shop needs a refrigeration service engineer, it is not possible to get one by hanging a "Help Wanted" sign in the window. Three years of careful training, based on natural intelligence and aptitude, are required before a man can be trusted to go out on a job without supervision. We have yielded up our men to a point where further inroads are certain to cause, within a few months, the breakdown in mechanical refrigeration facilities which I have predicted.

We must cause a genuine appreciation at Washington of the *seriousness* of the situation, and the alternative if we continue to lose trained and experienced refrigeration service engineers at the rate which has been

prevalent during the past year. We have lost some men, to be sure, who have *not* gone into military service, but who have gone into war factories. They have been moved to change less by the better wages than by the regular hours.

Under present conditions a refrigeration service engineer is *never* through for the day, any more than a family doctor. He is in many instances doing three men's work. I can understand why they change, and I have no word of criticism for them, of course, so long as they leave to go into factories engaged in direct war production. In such work they are helping to win the war no less certainly than in refrigeration repair and maintenance.

Replacement Parts

The situation with respect to replacement parts has become progressively worse. This, of course, has not surprised us. We know, as men of sense, that if the supply of critical metals in this country is so scanty as to threaten the production of direct war equipment and materials, we can expect little in the way of relief right now. It is not in the cards.

The Refrigeration Service Engineers Society was one of the sponsors of the Victory Program. We have "saved, simplified and substituted." We have done "many things without anything." Out on the job we have patched up mechanical refrigeration equipment in ways we would not even have considered a year ago.

We have been bothered on certain occasions by a lack of understanding and uniform practice among the jobbers, relating to the need for orders to bear priority ratings. The practice of some jobbers was to require a rating on nearly everything, even articles in stock, which did not have to be ordered from the manufacturer. The use of PD-1X, "Distributors' Application for Preference Rating," is now becoming general among the jobbers, so that purchases by the service men are somewhat less involved in red tape than was the case during the summer months. Lack of clear-cut decisions from the Refrigeration Section have puzzled both the jobbers and us. The case of copper tubing is an illustration. Nobody knows even today, so far as I can say, whether copper tubing is a raw material or a fabricated product. I wish that some of these things could be straightened out.

We understood that WPB Order No. P-126 is being rewritten, and we hope for more satisfactory ratings on replacement parts. Personally, I do not expect them. This may be due to the fact that the refrigeration industry has not made a sufficiently strong impression in Washington, in the endeavor to show that we are essential to the war effort, or it may be due to the fact that when war production requirements are met, nothing is left for us. We must make them understand down there that both our military and civilian health faces a crisis through the impending breakdown of mechanical refrigeration.

The matter of license certificates under P-126 is something which has caused much grief and confusion among our members. Many of them have not received licenses, or even the PD-399 application form. My own opinion is that the method of obtaining a certificate is too involved. We are refrigeration service engineers, not lawyers. Making application for an application is a little too much for some of the boys to figure out.

We shall be glad to join the other groups in seeking a revision calling for a single application, and placed with the jobbers in sufficient quantity. The application should contain such questions as (1) Do you devote full time to refrigeration service work? (2) How long have you been established? (3) What is your investment in specialized refrigeration service equipment and tools? (4) What is your investment in refrigeration parts? (5) Do you serve a sufficient number of customers in your community to give you standing as a public servant? The Refrigeration Section could investigate the claims made in such an application with a minimum of difficulty, and could then issue a license certificate promptly, which would hold good so long as the applicant remained in compliance. Under the present system there is great injustice. Some janitors and part time workers, who should never be allowed certificates, have nevertheless received them. Other established, full time service men, who certainly deserve certificates, have *not* received them. I ask the members of the other groups to help work out something along the lines I have suggested.

Two Big Problems

I have talked about manpower and replacement parts. These are the two big problems of regrigeration service engineers. To be sure, we have other troubles, but they are minor. If we could solve manpower and replacement parts, everything else would fall into place. I have talked most about manpower, because what good will a *landslide* of replacement parts do us if we do not have the men to install them? We are almost at our wits' end in trying to figure out some way to find relief. Perhaps some of you gentlemen from the other groups can think of something. I hope so, because we need your help now as we have never needed it in the past. Thank you.

The Refrigeration Jobber

Alex Holcombe, Jr., president of the National Refrigeration Supply Jobbers Association, followed Mr. Plesskott with a paper entitled "The Refrigeration Jobber Answers the Service Engineer's Problem." He said in part:

"We cannot help much to solve the manpower problem of the refrigeration service engineers. In the replacement parts problem, however, we are very much involved. Ours is the responsibility of providing a near-by source of supply of these replacement parts for our customers, the refrigeration service engineers."

Mr. Holcombe, referring to Mr. Plesskott's statement concerning a certain lack of uniform practice among the jobbers in handling of orders, said that he could not believe that any jobber today would require a rating from a service man unless such a rating is required by the source of supply. Copper tubing, he pointed out, is very definitely restricted by the Copper Branch of WPB, which has control of all of this metal. The speaker said he was told a year ago that the supply of copper was not sufficient to make the ammunition and other material needed by our fighting forces. Supply for non-war purposes, therefore, is impossible.

"The question has been raised many times by service men as to why we do not completely fill their rated orders," continued Mr. Holcombe, "It should be quite apparent that a shortage exists on many important refrigeration supplies. Every jobber could sell his entire stock in a few weeks. Then who would supply future requirements?

"In many cases the orders we receive are for greater quantities of an item than could possibly be considered 'an emergency service inventory' as stated in P-126. If each of you will carefully read this order you will find the emphasis on these two words 'emergency service.' The order was not intended to allow anyone to stock up for weeks or even months in advance of the actual requirements. Permission is not given to assign ratings under this order if you already have some of the same material in stock.

"Another angle which has appeared is the ordering of material which could not possibly be considered repair or maintenance material. Will you list some time the quantity of these items which you need for repairs—brass line shut-off valves, brass compressor shut-off valves, brass flare fittings, copper sweat fittings, and steel tubing? Much of this material which has been sold has been installed in violation of P-126. The question has even been brought up about selling condensing units for breakdown. Is it possible that many of these units have broken down so badly that they cannot be repaired? Usually the motor or the condenser, or even the compressor itself needs replacing; seldom does the entire unit break down and need replacing."

Fishbein on Refrigeration

The concluding address of the day was made by Dr. Morris Fishbein, Editor, Journal of the American Medical Association, a speaker of national reputation and an authority on medical problems.

"Today 72 per cent of homes in the United States have refrigerators," said Dr. Fishbein, "I venture to say that any attempt to interfere seriously with household refrigeration will do far more harm than good in the war effort."

He pointed out that most of the substances necessary for a healthful diet require competent refrigeration. He mentioned milk as a leading example, and showed how milk is dependent upon refrigeration for its wholesome condition from the cow to the table. He also discussed canned eggs, butter, margarine, cod liver oil, fish and meat products from the same standpoint.

"All sorts of food products," he warned, "must be refrigerated if they are to be safe for use at a later time. Records are available of veritable epidemics of food poisoning resultant from failure to keep salads and custards, and even ice cream, under proper conditions before serving."

Dr. Fishbein quoted extensively from a recent survey by the special committee of foods of the American Public Health Association to show the vital character of refrigeration.

" 'Your committee views refrigeration as a faithful ally and servant of all food consumers,' " concluded Dr. Fishbein, reading from the report, " 'Refrigeration has become so intimately connected with our daily life as to be practically indispensable. Like all servants, it requires proper and strict supervision. Fortunately, in this country, such supervision has been both adequate and capable, with rare exceptions. The use and advantages of refrigeration bid fair to expand as time goes on, to the benefit of the health, comfort, and pocketbook of our nation.' "

COMMERCIAL

INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING *Selling*

Holding a Service Organization Together —How to Keep Them on the Job

By Donald Delayen

NOW that the opportunity for existing on sales is gone, hundreds of refrigeration service firms have attempted to convert to service and repair work, and have been dismayed to find that though the business is undoubtedly there, there are no employes available to do the work. Not only is it difficult to obtain new personnel, but the veteran servicemen in the shop are disappearing rapidly. Military service, of course, accounts for part of the personnel loss, but in the main it is the lure of high-pay defense jobs which is preventing many refrigeration service firm owners struggling to meet the overhead and keep up goodwill from making a success of service work.

Out in St. Louis, Mo., one of the city's leading refrigeration service firms has gone through precisely the travail outlined above, but by seriously studying the matter, has developed a practical solution. Originally, the company had five mechanics, two working on domestic refrigeration, two on commercial refrigeration, and another with outside help maintaining air conditioning equipment. When range and refrigerator manufacturing curtailment came along, the service firm owner began at once to transform his shop into an efficient repair organization employing ten to fifteen people. The remodelling was complete and all tools installed when the owner woke up one morning to find three resignations on his desk from the former staff; all quitting on the same day.

Experienced Men Scarce

"It was pretty tough sledding," was the rueful comment. "We advertised for new experienced men continuously for six weeks without turning up a single worthwhile applicant before we decided that ordinary methods of obtaining men weren't good enough under war conditions. To make it worse, we had begun an ambitious advertising program for service work, which came piling in on us too fast to get out even with ourselves going to work with tools. Actually, it has taken us seven months to build a repair crew of competent men, and to discover the mistakes we were making in attempting to do so."

The mistakes, according to this dealer, began with converting to service work without first making sure that the men were available. The second was trying to

compete with high-pay defense salaries with ordinary methods. The third was overlooking the importance of keeping the men already employed on the job. As a result, this owner has worked out an eight-point "keeping them on the job" program which he believes will help any refrigeration service firm converting to service work completely. The eight "solutions" are:

An Eight Point Program

1. Hiring of former mechanics who have gone into other work several years previously. There are many such experienced with refrigeration repair five or six years ago who now find their current occupations endangered by priorities, materials shortages, etc. The St. Louis owner went to several mechanics associations to get a list of such men, spent plenty of time in "tracking them down" and offered each a worthwhile salary to return to his initial work. Though of course many are already busy on war work, two good men were turned up by this method, requiring only a small amount of "tuning up" to take over shop work again.

2. Use of older mechanics who retired from work several years ago. Here, too, there are many men experienced with refrigeration repair who have retired in peacetime, and are now "itching" to help in the war program but are too old for most defense plants. Such men can be of great help in repair service, not only in turning out actual work, but in training other people for it. The St. Louis owner here again used a list of veteran mechanics retired as much as ten years ago, and visited each personally with an invitation to return to work. Some can work only half days of course, but two half-time men are vastly better than none at all and they form the "nucleus" of the entire shop crew.

3. Use of part-time women and men employes. There are many healthy, husky women who can take over lighter repair jobs and leave the limited number of men free for more arduous work. At the St. Louis firm, women do all painting, coil bending, control mechanism adjusting, etc., and thus "releasing" mechanics who would otherwise have to do this work for refrigerator and compressor repairing. There are many married women who want to work half days, as well as physically hampered men who can step in for this purpose.

4. Use of high school and college students. Schools are glad to recommend mechanically-minded, deserving students who need work and who will be fast to learn during afternoons or on weekends. The St. Louis firm now uses three high school students who work each afternoon and all day Saturday. Two of them are capable enough to be handed major repair jobs after only a month or so of work with veteran mechanics, and will be valuable assets all through the war.

Retaining Present Employes

In addition to these ideas for procuring new people, there is equal importance in retaining those already on the staff. For this phase of the problem the St. Louis refrigeration service firm owner suggests:

5. Demonstrate to your regular employes the importance of service work and the fact that the country's food refrigeration must be kept in order through the year. Many servicemen do not see that they are helping to win the war in this connection, and the point must be thoroughly emphasized. At the same time they must be shown that their work will give them employment long after the last war plant has closed down, and that actually their net incomes will be better for staying with the peacetime occupation than by switching to war jobs which can "fold up" overnight. Records show that during World War 1 those men who remained on their regular jobs earned more than those who quit for munitions and other work.

6. Salary increases—with service rates generally up and much more work piling in, the shop can afford to raise wages to compensate. Naturally, few service firms can afford to meet defense pay scales, but they can demonstrate that the employe will share in larger profits. A mechanic disgruntled by the fact that his firm is making a large profit while his own income

remains the same in the face of rising costs will be the first to quit. Remember that everyone knows somebody earning $100 weekly paychecks on war work.

7. Pleasant working conditions. There are many ways in which the mechanic can be made to enjoy his job. First, he should have clean, appealing showers and dressing rooms with plenty of hot water, a sanitary restroom, good lighting at his work, and comfortable stools or chairs while on the job. If his family members are working night hours which makes it hard for him to see them, it is wise to give him arbitrary half-days off simply to spend with his family. Many "family men" will quit for no other reason. He should have weekend vacations, plenty of help with tough jobs, and be made to feel that the "boss" is his friend and anxious to help him along. Pleasant company and the job he likes are other assets which must be considered.

8. Finally, it is wise to set up a bonus system whereby the man who has the owner's interest and goodwill at heart and works long hours to maintain it is rewarded. Employes should be made to feel that they are associates and will share in profits; that there is advancement ahead for them. Payment of bonuses quarterly or semi-annually will provide an incentive to remain on the job—and coupled with the above methods, will help the owner going into service repair work to hang on to the men he needs.

Refrigeration Engineer Mounts Compressors on Bench to Save Space

By Bert Merrill

A WAR-TIME refrigeration installation designed for easy service and maintenance was recently installed in the Saliman's Paradise Restaurant, Denver, Colorado, by George H. Gorman, head of A to Z Refrigeration Service Company.

The restaurant, a $50,000 institution at 1700 Larimer Street near Denver's famous old Windsor Hotel and pioneer buildings, is a combination bar and restaurant, specializing in salads, sea food and other delicacies which demand careful refrigeration. Space being at a premium it was necessary to install a variety of coolers, refrigerators, etc., in minimum space, and to place the compressors in a basement hallway which is the only space which was not being used for food and other storage.

Cooling for water, beer, ice cream, foods and storage is supplied by five Frigidaire compressors in the new restaurant, each doing at least one unusual job, and two of them providing multiple temperatures which saved the cost of additional compressors. All five of the units, including three one-horsepower compressors and two ½-horsepower models, were ingeniously mounted by Mr. Gorman on a heavy wooden bench which runs along the right side of a basement corridor. The bench is 22 feet long by three feet wide, 32 inches above the floor, and is arranged with a series of small platforms so that any compressor may be easily removed without disturbing the rest. With controls also located on the bench, it has been possible to centralize repairs and service for maintenance of perfect temperature and service throughout.

One compressor of one horsepower provides drinking water refrigeration, another cooling for a 19x8x7 walk-in refrigerator divided into two compartments for meats and vegetables. The third one horsepower unit supplies a large salad and vegetable reach-in refrigerator in the kitchen. Two one-half horsepower units supply the dry-bottle box in the backbar, cold plate on the steam table and a small

(Continued on page 27)

Wartime Air Conditioning Installation Provides Unusual Economy Feature

By Herbert Hanley

PROBABLY the last full-scale air conditioning system to be installed in a department store for the duration, that of May Company, Denver, completed last Fall has been built specifically for war conditions and for maximum efficiency despite shortages in materials, power and repair parts.

The new system covers a new five-floor annex building and the old building of the same size. The first floor is conditioned by a refrigeration plant in a new sub-basement, while the upper four floors will get along with an air-washer system supplying water-cooled air through ducts and outlets which can be quickly converted to more efficient refrigerative cooling when the end of the war makes possible the necessary equipment. Novel war-time provisions include a smoke-detector in ductwork which will instantly shut off the entire system should incendiary bombs start fires in the area, a volume control to compensate for large crowds on various floors, and a two-way heating plant which will allow comfortable heat with a choice of fuels.

First Floor and Mezzanine

First floor and mezzanine are cooled by eight small coil-and-blower housings mounted around the balcony. These, fed chilled water in summer and steam in winter, have a capacity of eight tons cooling, and 6500 cfm. Cold water is piped from a 50-ton compressor with a single pump. Each unit is individually controlled to cool one of eight zones on the first floor, and can independently cool its area whether or not the other seven are operating. This eliminates the chilly spots of former department store systems and insures an even, economical temperature over the heavily-trafficked first floor. In winter, steam through the coils will likewise heat specific zones.

The four upper floors are cooled by a water-spray air washer, delivering 108,000 cfm if desired. However, it was found that half that amount, delivered through fourteen ducts supplying each floor was sufficient to cool the whole building, passing from the new section into the old. The variable speed air washer can be replaced with a compressor and chill-coils when available without making other changes in the system. Low heat-load on the new building, north of the old, makes this cooling efficient.

Most novel provision in view of war conditions is a photo-electric cell in each main duct which will instantly shut off the circulation of air when smoke is brought in from the outside. This "automatic watchdog" is a beam of light down the duct sensitive to heavier-than-average smoke. Thus, if a bombing attack should start a fire, no smoke will pour into the building to damage merchandise, start panics among customers, etc. Peace-time fires likewise damage merchandise of course, and the photo-electric cell is a permanent feature of the installation.

Automatic Damper Controls

Next, automatic damper controls on each floor will compensate the flow of cooled air according to the number of people on the floor. Anywhere from 10,000 to 50,000 cubic feet per minute can be supplied where special sales crowd one floor while others are almost empty. This will preserve an even 80-degree temperature over the store, seldom using the full capacity of the air-washer and its blower.

The problem of heating, serious to many stores whose fuel supply may be rationed, has been solved at the May Company by installation of two new low-pressure steam boilers. One of these burns crude oil, the

(Continued on page 31)

Two Important "Musts" for Refrigeration Owners—Service and Adjustment

IN these days of scarcity, maintenance plays a highly important part in the safe and economical performance of any type of mechanical unit and particularly with refrigerating machines, whether they be large industrial or commercial or smaller domestic mechanical units. According to P. L. Mackey, of the Interboro Refrigeration Co., Collingdale, Pa., "Back of the smooth-running efficiency of any mechanical refrigerator lies a knowledge on which the layman must depend. And this knowledge can only be supplied by a competent service man who knows all the inner workings of such a unit and knows how to repair it and put it back in running order again after some part has failed.

"No matter what the make of refrigerator," Mr. Mackey continues, "it must be serviced and adjusted at certain intervals. Outside temperature, for instance, has a lot to do with the inside efficiency of the mechanical refrigerator. The very success of its use in the home is the refrigerating unit and the economy of its operation depends upon how it is insulated against outside heat and the operation and proper adjustment of its many parts."

Responsibility of Service Men

In his opinion, Mr. Mackey says, the refrigerator service man now has one of the greatest responsibilities since the inception of mechanical refrigeration, particularly the smaller units use in the home, and it is his moral duty to keep that refrigerator going for the duration, and this must be done with a minimum of assistance from the supply parts manufacturer.

Mr. Mackey has been servicing refrigerators for over 12 years. He enjoys the work since he has followed it from its inception and has been close to its many alvancements during that period of time. He has seen the mechanical refrigerator develop from pioneer stage to the present when it is a novelty to find any home that does not have some kind of mechanical refrigeration.

At the present time, even though they have to work against the handicap of not having a full supply of materials and parts, he believes that the refrigerator service men of the country will be equal to the task.

He offers the suggestion, however, that it will be necessary for all of them to cooperate to the fullest extent possible in exchanging all data and service information that is available. He makes particular reference to THE REFRIGERATION SERVICE ENGINEER, believing that it has been and will continue to be of inestimable value along that line.

The Interboro Refrigeration Co. has been organized with the personnel and equipment to repair or replace sealed-in mechanisms besides being able to do all ordinary repair work. The company has built a high-class reputation both with the customer and the merchant handling refrigeration.

An unconditional one-year guarantee is given on all complete rebuilt service jobs and with this concession the customer knows there will be no further worry over the problem of keeping food supplies refrigerated.

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REFRIGERATION ENGINEER MOUNTS COMPRESSORS ON BENCH

(Continued from page 25)

ice cream freezer cabinet. Small signs on each compressor mounting identify the service it performs, and will enable servicemen formerly unfamiliar with the job to quickly ferret out trouble.

One one-horsepower unit has the unusual responsibility of maintaining four temperatures in the restaurant. By means of three snap action valves and one direct expansion valve, a butter box is cooled to 38 degrees, a salad case to 42 degrees, a vegetable refrigerator to 45 degrees, and through the direct expansion coil, a dry-bottle box back of the bar to 36 degrees. Another one-horse unit has the job of feeding a diffuser-type blower in the large walk-in refrigerator (controlled by a solenoid valve and a thermostat) and also a large beer cooler, at 38 and 34 degrees.

Army Training

How Refrigeration Service Engineering Is Taught at Camp Lee

By Maj. Allen N. Johannesen

The following article is a part of a speech delivered at a recent meeting of the Baltimore-Washington Section of the American Society of Refrigerating Engineers. Maj. Johannesen has charge of the school set up by the Quartermaster Replacement Training Center Refrigeration School at Camp Lee, Va. He gives some interesting details of the objects and curriculum of this school.

OUR school has two objectives, the larger being to produce what we choose to call "soldier technicians" capable of handling all tasks attendant to all related phases of an important item of supply in what has been termed a "War of Supply." The second and more concrete objective is to promote the abilities and capabilities of the soldier student by training him in the use of tools and equipment peculiar to refrigeration work, as well as the ones usually considered standard for mechanics.

We familiarize him with pipe and tube fittings, their specific uses, care and peculiarities, such as the reason for not using brass fittings in ammonia service. The multiplicity of accessories such as gages, driers, etc., are discussed with a view to their value as related to refrigeration. Controls come into sharp focus in our course inasmuch as present day equipment is tending more and more to completely automatic operation. We require a sound knowledge of the physical and chemical characteristics of the four refrigerants normally used, and a speaking acquaintance with the numerous other ones.

Instruction on Fundamentals

The operation and care of the various pieces of refrigerating machinery, such as compressors, pumps, fans, and engines get quite a bit of time and detail. Heat flow instruction, in theoretical as well as practical aspects, is treated as a basic need and creates a great deal of interest even among the older, more experienced students.

As is to be expected, the refrigeration cycle in its simple and more complicated forms gets intense treatment, the bulk of which treatment is on the compression system.

Ice manufacturing applications of refrigeration earn their portion of the schedule time with problems of brine flow, brine treatment, number of cans per ton, types of raw water treating process, types of equipment, harvesting procedures, etc.

Safety precautions are driven home as solidly as possible to eliminate unearned casualties. The refrigeration companies are closely coordinated teams that need every available man.

Cold Storage Operations

In addition to the foregoing topics, a schedule of instruction for cold storage operations is given the students. This schedule includes all operations related to the reception, checking, inspection, proper storage, and correct speedy issuing of perishable subsistence stores. Clerical knowledge of Government form handling, ability to distinguish the various fungi, diseases, etc., as well as physical causes for food to be considered unfit for human consumption, or not up to U. S. Army specifications, proper storage processes, and adequate sanitary measures all come into this part of the schedule.

The dose prescribed so far should leave no doubt in your minds that our course is streamlined to the *nth* degree. The elimination of false moves, non-essential discussions and distracting class room and shop influences, on the one hand, and the utilization of all the tricks known to the teaching trades on the other, are critically important watchwords for our entire staff.

Teaching methods and psychology have been quite well standardized the world over,

the primary aim being to get your subject over to the students in a form mentally digestible to them, with good ordinary horse sense dictating the particular method most effective for each individual problem. We consider our task peculiar in that, as small groups of students are added at the first of each week, it is necessary to isolate weeks, one from the other, taking generalities and basic principles of the topics to be covered in the particular week, and developing them to specific details and logical conclusions at the end of the week.

Direct lectures have long been considered the poorest form of educational means, controlled discussions have the added value of raising student interest and enthusiasm, demonstrative lectures are more effective in that they are concrete and reach more of the students' receptive senses, and are particularly effective when students are chosen at random from the class to perform the demonstration under the instructor's direction.

Directed, progressive, standardized shop jobs are invaluable, and extremely so when scheduled to follow immediately after instruction in the problem and its practical application to refrigeration. This type of effort, when supplemented by routine practical operation, and "catch as catch can" maintenance and service calls, should give a dependable, effective man for any operation requiring confidence in decisions and ability to carry through to ultimate objectives.

Practical Values Appreciated

One thing we have found since starting our school, is a more than gratifying display of enthusiasm on the part of the students. I must modify this by adding that this applies only when the students can be brought to realize the practical value of instruction. A lecture on means of determining capacities of ice tanks at different brine temperatures, brine temperatures required to produce desired quantities of ice in a given tank, etc., requires reference to tables and mathematical formulae and is quite a dry discussion as you can well appreciate.

To start a lecture class on this subject we say "Gentlemen, if you were sent to operate a strange ice plant, how would you determine the amount of ice it could produce? If you were instructed to make twenty tons of ice a day, how would you know what temperature should be maintained in the brine tank? The answer to these questions should be easily determined if you will follow closely the step by step procedures I will now outline for you. . . ." You can see, by this one example of the countless methods of creating a pointed interest in a subject, how we play upon the students' appetite for *practical* information.

Training Aids

I should say that this should conclude the educational problem discussion, but for one basically critical need, that being "training aids." This term can cover a multitude of sins, and a year's misdirected effort; but, be that as it may, we have come to hold in high esteem any object that can be made a point of focus, visual or otherwise, resulting in a concentration by the student on the subject at hand. Our visual aids are quite varied, ranging from inexpensive drawings of fahrenheit thermometers to hundred dollar large scale of three dollar controls.

The staff has a pre-arranged schedule, in which is listed the topics for which they are responsible, with recorded and indexed outline forms and details of training aids and instruction plans. This has given birth to what I call a wealth of "imagability," if I may coin the word, and a long definite step towards more effective instruction, and an earlier end to this holocaust by more efficiently doing our part.

We have men with six years' experience servicing Frigidaire units, men fresh from university courses in heating and ventilating and thermodynamics, sitting alongside ice-pullers, oilers, etc., and this conglomerate group is to be trained for mobile rotary compressor gasoline engine unit operation, cold storage workers, or ice plant chief engineers. We don't know what line of work they may be sent to so we decide to give them all general principles, to absorb which they should have an effective understanding of refrigerant characteristics, and this subject requires a knowledge of Mollier Charts which are merely graphical representations of mathematical formulae. To lead them up to this point we start with simple arithmetical basics M D A S, and for twenty minutes are unable to get correct answers. The failure spurs the students to special efforts not to be caught lacking again.

S S S

Gifford Radio & Electric Serv.
Fayette, Ohio

I always enjoy each issue and gain something of ideas that pay out by use.

Refrigeration Performs Vital Services in War Production Work

COMPRESSORS that produce iceless refrigeration have gone into war production work with many strange new duties, the Compressed Air Institute announced recently. Instead of having to keep butter, milk, eggs and pineapples cool and tasty, iceless refrigerators are given such tasks as chilling airplane instruments, freezing pitch on optical lenses and providing rigorous work-outs for the molecules in high precision gauges.

Because of the accuracy with which many machine parts have to be made, the problem of accuracy in gauge production has become a prime industrial headache. It has often happened that a prospective user of one of these precision instruments has found that after he had purchased a gauge and used it for a while it would have become larger than it was originally. Rejections of gauges due to growth were entirely too frequent. Installation of compressors to create sub-zero temperatures has proven a very effective answer to such problems in many plants, the Institute reported.

Preventing Growth of Gauges

In the process of manufacturing the gauges, to prevent the annoying tendency to grow, the gauges are placed at various times in iceless refrigerators, which develop temperatures as low as 75° F. below zero. One manufacturer stores them at sub-zero temperature until they are thoroughly chilled and then rough grinds them. After rough grinding, he places them in the box again and keeps them at the sub-zero temperature for 48 hours. After removal once more, they are finish ground and lapped to size. The manufacturer reported "experience has shown that they do not change after this treatment. Rejections due to 'growth' have dropped to a minimum."

Another manufacturer reported to the Compressed Air Institute that after the steel in his gauges is ground to within 0.002 inch of finish size, the parts are kept from six to eight hours at 40° F. below zero and then taken out of the refrigerator. When the temperature of the metal reaches 70° F., it is finish ground and lapped.

"In general, for carbon and vanadium steels as well as manganese non-deforming steel," a third manufacturer reported, "we usually submit the piece before the final finish grinding, to the following treatment: (1), Temper at 300° F. for suitable length of time and cool to room temperature; (2), Cool at least to 70° F. below zero and hold for a suitable length of time and then allow the piece to come back to room temperature."

Keeping Die Sets Uniform

Some manufacturers have installed compressors for refrigeration to keep their die sets at uniform size. The die sets are chilled to below zero. This keeps the guide pin alignment stable over a definite time, thus prolonging the life of dies.

The process by which gauges and die sets change in size after they are formed, is not thoroughly understood. It is believed to be a molecular phenomenon, however, and that alternate warming and chilling of the metal tends to stabilize the molecules in some way.

Some factories have installed compressors to provide cold storage for aluminum alloy (ST 24 and ST 17) rivets used in airplanes. Before they are driven, the rivets must be heat treated. This makes them soft and ductile, but after they have been kept at room temperature they gradually become hard. The hardness reduces their ultimate shear strength after being driven into an airplane wing or fuselage.

Tempering Rivets

To overcome this difficulty, the rivets are kept in refrigerator cabinets until time for their use. The cold storage temperature may run as low as 50° F. below zero. At that temperature, the rivets remain for two weeks or more at a stage soft enough to permit them to be driven. Sheet aluminum alloys, used also for airplanes, are given similar treatment to make the sheet metal workable.

Instruments used by airplanes going into sub-stratosphere regions must be subjected to unusual tests in order that they perform properly under all conditions to which they are subjected. Therefore, they must be tested under these sub-stratosphere conditions where temperatures go as low as 67° F. below zero. To receive the proper tests they are also put into cold chambers where the temperatures go that low and lower.

Because they are subjected to the same conditions, similar tests are given to hydraulic controls, transmission tubes, lubricants and other fluids used in airplanes. Another application of the cold chambers is their use in improving shrink fits. The chilling process reduces the danger of shearing, which occurs when parts are press fitted.

Temperature of Precision Machines

In airplane plants, many of the metal-working operations tend to heat up precision machines used to give the highest accuracy to aviation engines. To prevent changes in temperature, refrigeration apparatus is used for cooling the surrounding air.

Plants using accurate gauges store them in rooms in which the temperature is carefully controlled by refrigeration.

Radio instrument manufacturers have installed compressors for refrigerating where delicate instruments are tested. The problem is to keep the air free of moisture.

In the manufacture of optical lenses, the lenses are coated with pitch, which has to be carefully removed, and the removal often takes as long as two weeks. So refrigerators have now come to the aid of optical lens makers. When the lenses are placed in the sub-zero temperatures, the pitch becomes hard and brittle. This causes it to crack, and then it can be peeled off very easily.

Testing Synthetic Rubber

The sub-zero temperatures are also used in the testing and manufacturing of certain synthetic rubbers, while refrigeration is also used in many plants for the cooling of oils and other coolants for metal working.

Refrigeration is being applied in an effort to reduce the moisture content of air that goes into the blast furnace for making pig iron and as a result, to speed up iron production.

Such air conditioning appears to be desirable when it is considered that the moisture must be broken down in the furnace into its constituent hydrogen and oxygen. This requires a considerable consumption of heat that might well go into the recovery of iron from the ore.

There are seven grains of water in every 1,000 cubic feet of air under ordinary conditions. If air with this much moisture is blown into a furnace at a rate of 80,000 cubic feet a minute, this means that the amount of air going into a furnace during 24 hours is 50 tons. To break up this much water requires the heat from nearly four tons of coke, a rather formidable expense over the period of a year. Refrigeration may be a solution to this problem.

Spot Welding

Refrigeration is also used to cool the ends of electrodes used in resistance spot welding of such things as aluminum or heavy steel sheets. Aluminum is one of the most critical metals to resistance weld because of its high electric conductivity and the high current values that have to be applied. This permits the electrode to heat up to such an extent that the electrode metal sometimes alloys with the aluminum.

By installing compressors as part of the welding equipment to create refrigeration, the user lowers the temperature of the electrodes to such an extent that they become coated with frost.

It is claimed with this method of cooling the welding apparatus can complete 800 to 1,000 per cent more spots without point dressing, and reduce the down-time on a given production run by 75 to 90 per cent.

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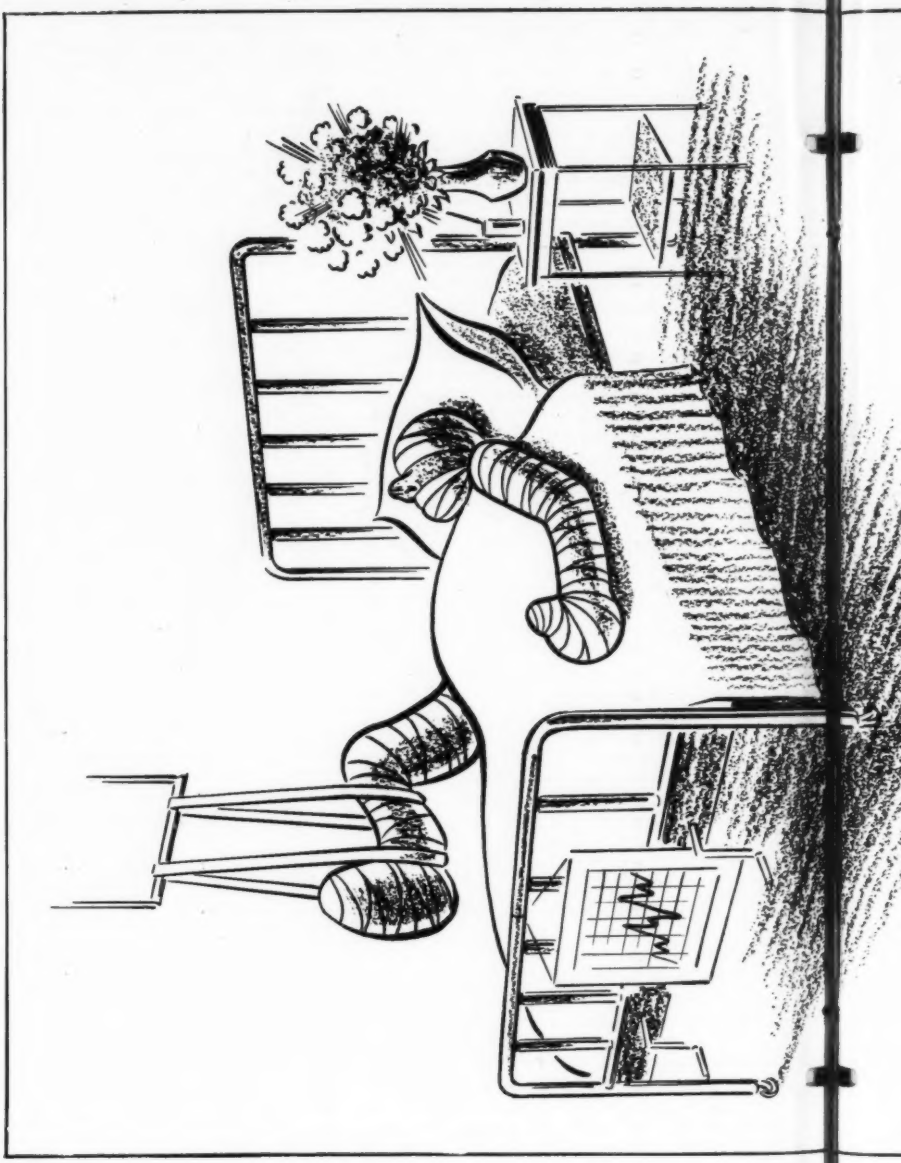
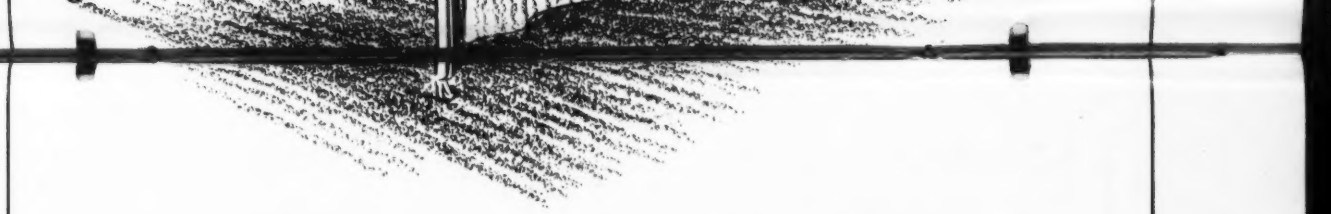
WARTIME AIR CONDITIONING

(Continued from page 26)

other coal, and each is capable of carrying the entire heating load on its own. Use of the coal-burning boiler will enable the company to use as fuel huge accumulations of waste which formerly were thrown away. Both boilers include a hot water coil; and supply 30,000 square feet of radiation on the upper four floors, as well as the coils in the eight first-floor individual units. In the event that oil is no longer available the May Company can thus get along on the coal boiler for the length of the war without strain.





"Time out" for Repairs

"Time out" for repair of refrigeration systems is serious these days when refrigeration dealers are hard pressed for men and material. Too long a "time out" may mean spoilage of food for our armed forces, our war workers, our families.

In the interest of conservation of time and in the education of new service men entering the refrigeration field, we have prepared a "Service Analyzer", (Form 1147) describing troubles encountered in refrigeration systems, their symptoms and probable causes. Also available is a bulletin on "Operation and Testing of Thermostatic Expansion Valves", (Form 1098).

This information will help you cut down "time out" for repairs. Write for your copies today.

DETROIT LUBRICATOR COMPANY

General Offices: **DETROIT, MICHIGAN**

Canadian Representatives: Railway & Engineering Specialties Ltd., Montreal, Toronto, Winnipeg

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

RETURN LINE FROSTING

QUESTION 520: I have a job which I am puzzled about, it is this, a few seconds before it shuts off the suction line frosts all the way back to the compressor which is in the basement.

I installed a new automatic expansion valve on it a few days ago, the suction and discharge gauges show the correct back and discharge pressure. It is a methyl charged job.

ANSWER: I don't think there is anything wrong with this refrigerating system apart from the need of reducing the back pressure at the expansion valve. Even though the suction pressure is now correct according to your calculations, the frosting on the suction line indicates that the back pressure setting of the expansion valve is too high for the temperature being maintained in the evaporator.

If you will reduce the suction pressure until this frosting no longer occurs, you will have the correct valve setting.

LEONARD FLOAT STICKS

QUESTION 521: I have a Leonard Model L5-27R; unit No. 65029 Ser. No. 1901993; charged with 1 lb. F12. Unit never worked satisfactory since purchased. The high-side float sticks almost all the time. I was contemplating changing it to a capillary tube job, using F-12. Is this advisable, and if so, what length tubing and diameter should I use? Does diameter of capillary matter a lot for F12, SO_2 and Ch_3 Cl.?

Or would you advise to cut the old high-side float off (old one is brazed on) and replace same with new high-side float?

Another question I would appreciate answered: when charging any system with any refrigerant, I sometimes use Presto-lite to heat the drum and being in a hurry, at times, I play the flame on hurriedly. Noticing the pressure I watch it go up (as is expected). Then all of a sudden my expansion valve seems to stick and of course the pressure keeps on building up.

Now is it possible that the refrigerant drum is cold and I quickly play the flame on it, thereby, causing moisture to form in it, and charging the same into the system? I noticed that many times if I forced the charging it caused trouble at my expansion valves.

ANSWER: The Leonard high side float system can be changed to a capillary tube system. However, it is my opinion that you will save yourself considerable lost time in experimenting if you would replace the high side float with another high side float.

While the capillary tube could be used satisfactorily, it is difficult to determine just how much of what size tubing to use. Ten feet of .095 OD tubing would hit it pretty close, but depending on the capacity of the pump and the amount of refrigerant being circulated, this length of tubing may have to be changed.

Therefore, rather than experiment in trying to determine the exact length required, you would have less trouble in replacing the float.

Before blaming the float, however, I would make sure that it is not air in the system or moisture that is causing the trouble. It is possible that there is sufficient air in the system to air-bind the float; or, in other words, to fill the top part of the float to the point where no more liquid would enter.

It is also possible that moisture in the system is freezing at the outlet of the float and clogging it so that circulation of refrigerant is stopped. Naturally, if any of these conditions are affecting it, replacing the float would not improve your situation.

With regard to the action of the expansion valves when charging—in the first place, I don't believe it is good practice to use a Presto-lite torch to heat the drum. There have been many accidents caused through this practice, and it is much safer to use a pail of hot water in which the drum can be inserted, thus limiting the temperature to which the drum will be exposed.

Very often an expansion valve will stick because a needle is forced into the soft seat and because these needles are tapered, they are inclined to wedge themselves into the seat. Very likely when you force-charge the system through the low side in the manner you have described, you are so increasing the pressure on the low side of the

system that you force the needle of the expansion valve into the seat at a great deal higher pressure than during normal operation.

If the valve then has a tendency to stick or if the needle has a tendency to wedge in the seat, you may have an indication of the valve sticking or freezing closed.

I think that if you will govern the pressure in the drum while you are charging so that the low side pressure never exceeds the normal high of the low side, you will not experience this difficulty. The trouble could not be due to moisture in the drum unless moisture was there before the charging operation began. Applying heat to the outside of the drum cannot cause moisture to enter into the drum.

G. E. PRESSURE SETTINGS

QUESTION 522: I have under observation a CB3-B16 G.E. refrigerator which uses an expansion valve and a continuous coil on the evaporator. The only time the evaporator is completely refrigerated is when the expansion valve is set at 0 lbs. pressure, regardless of the amount of SO_2 in the system and how long the machine runs.

Since this valve setting is too high for satisfactory temperature, would you tell me why this job should not operate O.K. with a valve setting of 8" to 10"?

Another thing, could you say what sort of a float valve or check valve is to be found in the header of a Majestic flooded evaporator?

ANSWER: The information you have given me is very brief, and I am not able to determine any specific cause of the trouble with the General Electric refrigerator.

If the unit will not pull down to the desired pressure, it is an indication of one of two things—either the unit is not large enough for the load imposed on it or the compressor is inefficient. The latter is more likely the trouble because undoubtedly this machine has worked satisfactorily previous to this trouble.

It may be that the compressor valves are not holding properly or some other difficulty within the compressor prevents it from handling the volume of gas it should handle. A lack of oil in the compressor might be another cause for this trouble.

With regard to the Majestic flooded evaporator, I am not sure which type you are speaking of since all Majestic systems were flooded systems, but both the high side

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float and the low side float have been used. The older open type of Majestic which employed a belt driven compressor was equipped with a low side float evaporator. The later models which were hermetically sealed and thus direct driven employed a high side float system.

These high side float evaporators were built with a header in which was contained a floating cup known as an oil skimmer. This cup floated on top of the refrigerant and oil in the header, and when the refrigerant became high enough to spill over the top of the cup, the oil was trapped in the cup since it floated on top of the refrigerant. The suction cup extending from the suction line into this cup acted as a means of returning the oil to the compressor.

A complete description of this system together with diagrams and illustration of the entire system was contained in the January, February and March, 1937, issues of THE REFRIGERATION SERVICE ENGINEER.

GRUNOW

QUESTION 523: I have two Grunow household boxes operating on carrene gas employing the high side float, one is a model 50 M and the other a S. D., both hermetics. I haven't had much experience with these boxes or the gas they employ though I am somewhat familiar with this type compressor. Is it possible to use sulphur dioxide in these machines if I cut out the float and use a capillary tube? If so what length capillary should be used? What other changes should be made if any?

ANSWER: Sulphur Dioxide cannot be charged into the Grunow refrigerator in place of Carrene for the reason that the operating pressures of Sulphur are so much higher than Carrene.

Due to these operating characteristics the capacity of the Grunow would be so increased when charged with sulphur dioxide that you would overload the motor and the motor would continually kick out on the overload control.

I don't know of any other gas that you can use on these units, and for that matter, Carrene is so easy to handle that there seems to be no reason for making any change at this time. Carrene is easily obtainable from almost any jobber, and because of its low operating pressures it can be handled in open containers like water. Its boiling temperature is around

102° F. and, therefore, at ordinary atmospheric pressures the refrigerant remains in liquid form.

Rather complete service information on the Grunow was contained in the December, 1941, and January, 1942, issues of THE REFRIGERATION SERVICE ENGINEER.

NORGE MULTIPLE

QUESTION 524: I have a Norge Model S which runs almost continuously. This job has two suction lines. As I have never worked on this type of unit, I am not sure how to test the trouble. Would you please give me any information you can on the hookup of this unit?

ANSWER: I have no information here on the Model S Norge Refrigerating Unit. I take it for granted that this is a commercial unit and since it has two suction lines, I suppose it has two evaporators connected to it. Some units are provided with two suction ports which take the place of a manifold in the system. Thus, instead of having the two suction lines joined at some place in the system into a common suction line leading to the compressor, these units provide for the two suction lines to run all the way to the compressor.

Testing for troubles on the unit is the same as any other manifold system, except that it is sometimes possible to test the pressure of the individual suction lines by shutting off one and obtaining the operating pressures on the other. This provides a convenience in making tests on the individual expansion valves.

GENERAL ELECTRIC

QUESTION 525: I have been called to service a General Electric household refrigerator, a 1934 model, which is charged with methylformate. This refrigerator was purged in 1935-1937 and 1940, and after being purged operated perfectly.

As this is a sealed unit I do not understand why it requires purging. I have worked on sealed units, but never one that needed purging so much. I would like to know just why this model requires it so often.

ANSWER: Air is not always the necessity of purging the refrigerating system, and it is for this reason that we usually refer to the gases purged as uncondensables. Uncondensables may be air which has been drawn into the system through a leak to the atmosphere, or they may be products of decomposition.

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While the collection of such gases may take considerable time due to the decomposing of the oils, and materials contained in the system, these products tend to form gases. The action is usually speeded up if the system is slightly acid, and as the oils and other products in the system slowly break down the gases are collected at the float valve of the system.

The fact that this General Electric you speak of has only been purged three times since 1935 indicates how slow this action is. It is nothing to worry about and there is probably nothing you can do about it to prevent it.

FRIGIDAIRE EE-5

QUESTION 526: I want to get some information regarding Frigidaire Model EE-5. I changed the ex-valve as the one that was on was defective. I put on a Detroit Valve. I also changed the switch. It ran O.K. for about three weeks, cycling about 7 minutes on and 12 or 13 minutes off. But now it runs too much. I checked evaporator temperature and it fluctuates from 8° to 22° or more. The low side pressure stays stable at valve setting of about 8" vacuum and I can't account for the fluctuation of the evaporator temperature. Would too much oil cause such a condition? The oil is filled to a point about even with crank shaft in compressor. Would that be too much? The crank case of compressor gets quite warm also.

ANSWER: There are two or three possibilities which may be causing your trouble on the EE-5 Frigidaire unit. First of which is that I believe the suction pressure of 8" is too low. These units should operate satisfactorily on a suction pressure of 5 or 6". This higher suction pressure will make the unit operate more efficiently, thus, cutting down your operating time.

It may also be that there is too much oil in the system, although I have no means of determining this from the level of the oil stated in your letter. The correct oil charge for these units is ½ pound. Perhaps it would be better to remove all the oil now in the compressor and refill with this measured amount. Other things which would cause the unit to run with too high an evaporator temperature, are a leaky flapper valve or insufficient refrigerant. The total charge of refrigerant for these systems is 2 lbs. of SO_2, although they will operate on as little as 1½ lbs.

FRIGIDAIRE "YD" CONTROL

QUESTION 527: On Frigidaire low pressure controls type "YD" I have had trouble with the contact points not breaking clean when the switch cuts out. This arcing causes the starting switch to chatter or the motor to jerk. I would greatly appreciate your advice and a direct means of correcting this.

ANSWER: I would expect from the nature of the trouble on this job that the magnet on the switch has slipped and does not allow the movable contact to come close enough to it to hold it properly, or that the small copper movable contact has burnt to the point where it has no tension against the stationary contact, or that the contacts are just plain deeply pitted. Correction of these troubles is, of course, self evident.

The steel part of the movable contact arm should be close enough to the stationary contact so that the fiber washer on the copper movable contact is lifted off of the steel arm. If this switch is properly adjusted so that the copper movable contact exerts a fair amount of tension against the stationary contact and the steel arm is close enough to the magnet no trouble should be experienced with this switch in breaking clean.

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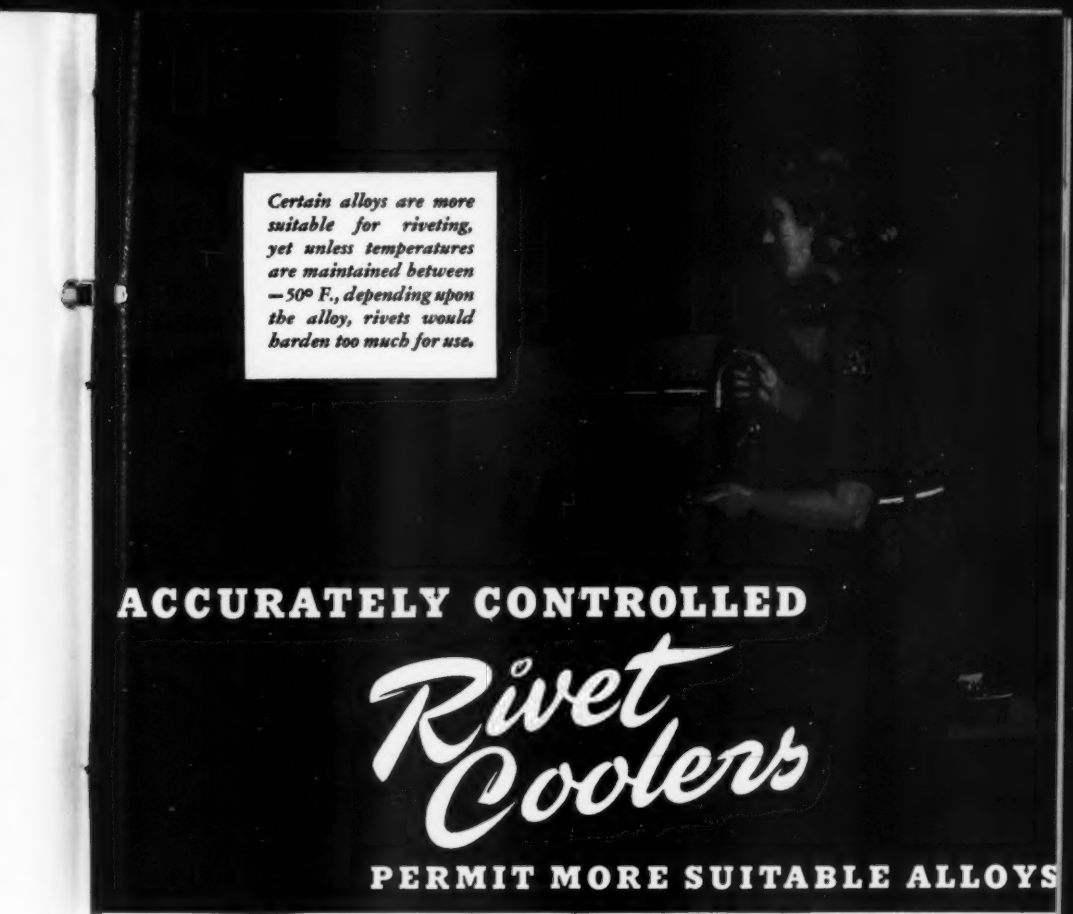
Certain alloys are more suitable for riveting, yet unless temperatures are maintained between —50° F., depending upon the alloy, rivets would harden too much for use.

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ACCURATELY controlled portable coolers permit use of alloys more suitable as rivets. This is another way in which accurately controlled refrigeration can increase the war production capacity of existing machinery. To perform its function with the most effectiveness, refrigeration, of course, must be accurately controlled. You can do this better with M-H Controls . . . Minneapolis-Honeywell Regulator Company, 2934 Fourth Avenue S., Minneapolis, Minn.

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Welding Award Study of Refrigeration Plant Cuts Piping Cost

A REFRIGERATION plant, which utilized welding in the greater part of the ammonia piping system is illustrated on the front cover of this issue. This plant was described in a paper which won the author, Wayne Buerer, assistant professor, Mechanical Engineering, M. E. Laboratory, Oklahoma Agricultural & Mechanical College, Stillwater, Okla., an award of $700 in the 2½-year $200,000 welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

This refrigeration plant is for use in a college laboratory and is provided with arrangements, such as thermometer wells, for measuring quantities which affect its operation. Arc welding was used for the greater part of the ammonia piping system. Instead of using elbows, the pipe was heated and bent to about 10-inch radius. The cost of this piping system was $51. The cost using usual methods with pipe threading would be $70, the saving being 27 per cent.

Prof. Buerer is a graduate of the University of Nevada.

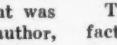
Cost Saving Showed

The Lincoln Foundation $200,000 Progress Award Program, results of which were announced in October, showed a possible annual cost saving of $1,825,000,000 including 7,000,000 tons of steel valued at $271,000,000 and 153,000,000 man hours of labor available by utilization of arc welding.

Papers were submitted from 46 of the 48 states by engineers, designers, architects, maintenance men and executives throughout the industrial field. Altogether, 408 awards were made to 458 recipients, the difference covering joint authorship. Awards embraced 46 divisions of participation, which encompassed the entire industrial field.

The great mass of important new welding data contained in the papers will be made available as soon as possible for the benefit of war industries, in the form of articles in trade publications and other magazines and eventually in book form. This was done at the conclusion of the last Foundation Study in 1937-38, and resulted in the dissemination of information which became vital in the nation's war production, utilizing welding.

The book, "Arc Welding in Design, Manufacture and Construction," containing 109 of the oustanding papers from the first program, has become a standard reference guide for application of arc welding to war production. The Foundation was founded in 1936 in honor of James F. Lincoln, President of The Lincoln Electric Company, Cleveland, by the company's board of directors.



YOUNG SERVICE MAN BUILDS BIG WHOLESALE BUSINESS

VINCENT J. SWEENEY, of Madison, Wis., who has been operating a service organization under the name of Automatic Temperature Supplies, Inc., since early in 1941, in a recent letter to THE REFRIGERATION SERVICE ENGINEER states that he plans to enlist in the armed forces in the near future. But with this letter he also announces that his customers will always find the same service they have received in the past regardless of personnel changes.

Mr. Sweeney, after graduating from high school in Madison, worked for a refrigeration wholesale house, becoming manager of the main branch office, and in February, 1941, started operating the Automatic Temperature Supplies, Inc., with a partner who is no longer engaged in the business. Sales of maintenance and repair parts, he says, have increased with the growth of the organization but they have made a point of advising all customers to have all discarded equipment repaired by manufacturers if at all possible, thus reducing the necessity of local service men carrying extra stocks.

Mr. Sweeney, incidentally, is probably the youngest wholesale refrigeration supply jobber in the country, or at least so he claims, at 22 years of age. His immediate future is bound up with the armed forces of the United States, but beyond that he is looking forward to the time when he can come back and really go places.

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Now, in this new book—just published—is included refrigeration **theory—practice—applications**—set down in easy-to-understand language for both the student and the engineer—practical and authentic information that will help you to diagnose, correct conditions, operate and design an efficient installation.

REFRIGERATION *Theory and Applications*

by H. G. VENEMANN

Associate Professor of Refrigeration
Purdue University

The author, H. G. Venemann, Associate Professor of Refrigeration, School of Mechanical Engineering, Purdue University, Lafayette, Indiana, has a wide background of practical refrigeration experience. The book is the result of many years' study of refrigeration problems both in the field and as an instructor and is presented to the operating engineer and student as a complete treatise on fundamental principles involved in processes of refrigeration with typical applications to assist the engineer and student to design and operate plants.

The subject matter is graphically presented by the use of charts and illustrations in chronological order and the Table of Lessons reproduced indicates the important subjects discussed.

One of the principal features of the book is the problems presented to the reader at the end of each chapter. By this method it is comparatively simple for the reader to self-examine himself on the subject covered in each chapter.

264 Pages
66 Illustrations
41 Tables
13 Fold-in Inserts
Book Size 8½x11½ in.

TABLE OF LESSONS

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Refrigerants.
Air as a Refrigerant.
The Theoretical Compression Cycle.
Variable Loads and Their Influence on Compressor Performance.
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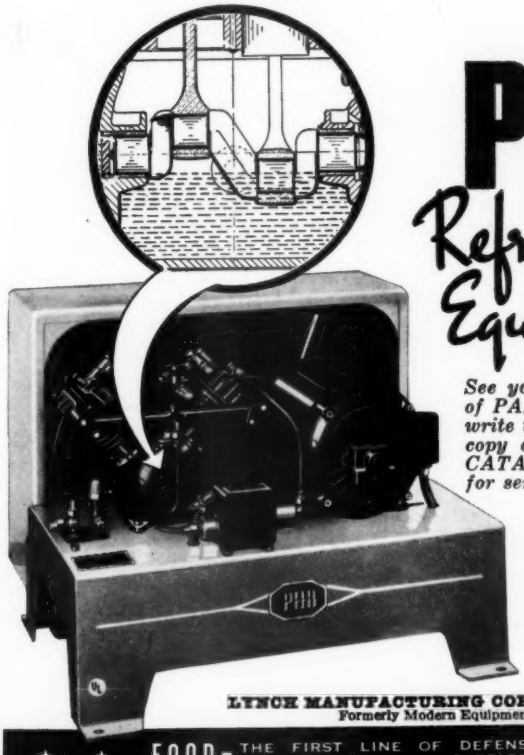

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Season's Greetings

ONCE more, at this season when "peace on earth—goodwill toward men" should prevail, we pause to affirm our faith in the fundamental principles of freedom, lighting the whole world, without the obscuring cloud of hate and prejudice.

To our R.S.E.S. members everywhere—at home or fighting on the far-flung battlefronts to preserve our way of life—we send these holiday greetings to you and yours, with a fervent hope that the day of victory may not be far distant.

J. W. POWER, *Acting Secretary* — E. A. PLESSKOTT, *President*

C. BUSCHKOPF	S. B. GARLAND	C. J. DOYLE	W. MARSHALL
W. W. ALLISON	J. K. BUSH	J. L. DRISKELL	W. W. FARR
A. D. McGILL	A. M. PALEN	E. A. SUMMER	A. M. FENWICK

KENNETH GOECKEL NEW ARRIVAL

MR. and Mrs. William Goeckel are the proud parents of a fine baby boy, Kenneth William, born October 31. Both mother and baby are doing well and daddy is busy passing out cigars.

Keep an eye on little Kenny. If he takes after his dad he will be a good prospective member for the ranks of the Refrigeration Service Engineers.

Bill Goeckel is the Secretary-Treasurer of the Niagara Frontier Chapter.

x x x

R.S.E.S. Chapter Notes

COLUMBUS CHAPTER

November 10—After a short business meeting H. N. Kazee gave an interesting lecture on Sil-Fos and Easy-Flo low temperature brazing. Following the lecture, actual demonstrations were made in the shop of the Franklin University. Sample specimen brought in by members were discussed and breaks repaired. In view of the present parts shortage situation these instructions should prove most helpful from the standpoint of saving and salvaging a large number of otherwise worthless broken parts.

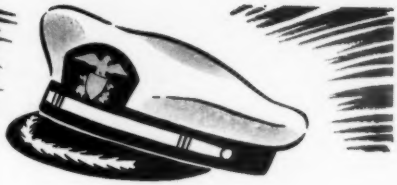
LOS ANGELES CHAPTER

Among the recent activities of the Los Angeles Chapter is the issuance of a membership bulletin just before the meetings, which also serves as a notice of the meeting. This bulletin serves the purpose of notifying members of what discussions will take place at the meeting, while at the same time giving them some topics which will help them enter their opinions when they arrive. A recent bulletin issued before the November 25 meeting provided their members with complete information on gasoline rationing and further announced a discussion on the matter to take place at the meeting.

SAN DIEGO CHAPTER

October 8—The meeting was called to order by President Pitts. Acting Treasurer Phillips was immediately called upon for a report of the treasury. The Secretary was asked to investigate the use of the Society emblem in the phone book by various advertisers.

Enlisted



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1. It reduces power costs.
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Write us for full particulars and instructions for installation and operation.

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WINNERS OF NAVY "E" AWARD

Louie Jorgensen was asked to contact Mr. Proctor of the W.P.B. in an effort to secure his services as a speaker at the dinner meeting to be held at Park Manor, November 5.

The entire meeting was devoted to business matters of the chapter with mostly the educational program being planned. Some time was devoted to arrangements for the forthcoming dinner to be held at the Park Manor. The meeting adjourned at an early hour.

WORCESTER CHAPTER

November 10—Out of respect to our late Jeremiah P. Moynihan, the regular November 3 meeting was postponed until this date.

Meeting at Jim Hammill's office . . . 16 members . . . 5 members in the Armed Services . . . good attendance for a rainy night . . . Prez Colbert detained . . . little after-supper plumbing business on the side . . . Jim Hammill, 1st Vice Presided with his flit gun . . . usual business routine . . . Pierce Goodney brought hard caramels . . . two caramels to the Secretary . . . the minutes sounded like a Russian weather report . . . strange that the boys with Sears Roebuck Perpetual Smilers do not eat candy on rainy nights . . . Tom Cronk interrupts to show pictures of an October meeting . . . Jerry Leonard and Ed LaFlamme in the Army . . . the doctors felt of Sam Gaffin's

OFFICERS AND OTHER PROMINENT MEMBERS OF WORCESTER CHAPTER

Upper left: Michael F. Colbert, President of Worcester Chapter No. 1, R.S.E.S. (Looks like a $200 per week labor organizer urging $12 per week mill workers to hold out for a five per cent increase. Grinning background by C. S. Van Wert; tie by gracious.)

Upper right: Left on the Sill—Our jovial, rollicking Tony Osper in his gayest pose. And he is our Entertainment Chairman. Right, seated, Earl Rockwell. In the center, with a head like the top of a Freon drum, John Brosnan, Secretary-Treasurer, getting first crack at the Grab-Bag; President Colbert edges forward for his kick-back; Felix Gargulinski is working nights so we use the pole in rear background to credit him with attendance.

Lower left: Left to right—Al Moors, C. S. Van Wert and President Colbert.

Lower right: Left to right—rear—John Kroll, John Doresk, Tony Matregrano, John Osper and Tony Osper. Front left—Illuminated by that tie—Amos Stuart of the Electric Light Company and Al Manninen.

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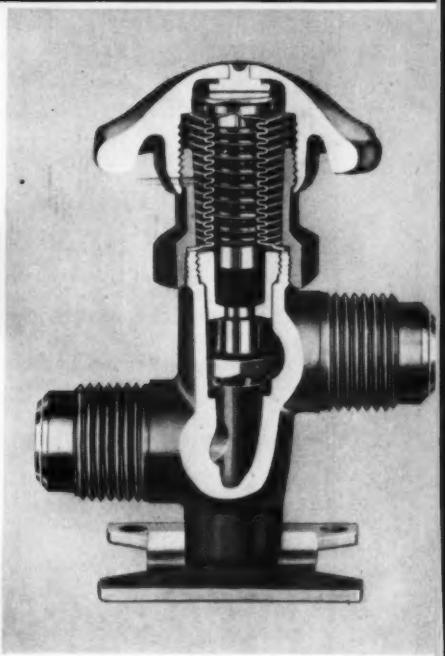

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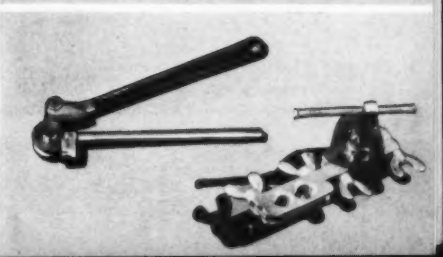
With IMPERIAL TOOLS you can do a BETTER installation job

● Imperial Tools for cutting, flaring, bending, coiling and swedging tubing make it possible to turn out a good looking, tight job without injuring the tubing.



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1204 W. Harrison Street, Chicago, Illinois

DFN
SYSTEM

Dehydrators
Strainers
Filters

•

EFFICIENT—ADAPTABLE FOR EXACTING REFRIGERATION REQUIREMENTS

•

ask your jobber about the DFN SALVAGE PLAN

McINTIRE CONNECTOR CO.
Newark New Jersey

Repairs or Replacement

Make present equipment do for the duration! Use the genuine replacement parts shown below. We always carry a complete stock.

GENUINE REPLACEMENT PARTS FOR

CHIEFTAN
UNIVERSAL COOLER
SERVEL
COPELAND
ICE-O-MATIC
PAR
GRUNOW

Automatic
HEATING & COOLING SUPPLY CO.
647 W. LAKE ST.
CHICAGO
DISTRIBUTORS OF GATES BELTS FOR REFRIGERATION

shoulder . . . pronounced it warm . . . he reports the 27th . . . at three expansion valves per month . . . Jim Hammill, ex-Springfielder, urges large attendance at State meeting . . . a dozen pants-wearers buy solo tickets . . . Mrs. Hammill, Mr. Colbert, Mrs. Manchester and Mrs. Davis will bring their husbands . . . Tom Cronk dons costume of Educational Program guest role . . . talked about compressor efficiency . . . also, talked about an hour and a half . . . proper clearance to a split hair degree produces efficiency . . . to split a hair of Secretary's dome . . . multiply factor by nil . . . Examiners Osper, Moors and Gaffin get an answer to their service problems and classify Bob Lyons and Les Atchue as active members . . . Adjournment at late hour . . . Sarge Davis passes out late slips for wives of married members . . . George McKiernan revives Treasurer . . . Lyons and Atchue had produced money for initiation and dues without a request.

COLONELS CHAPTER

In a report received from H. C. Moore, Secretary of the chapter, he states "This has been an extremely heavy summer on everyone here because so many of the men have quit refrigeration work and are working in war plants or are in the armed forces. Among those absent are: Mr. Shuell, who is now in the Navy. Mr. Tingle is with the Navy Construction Crew, Mr. Mercer is working at a local Neoprene plant, Mr. King at the Naval Ordnance plant and Mr. Hood has a defense plant job in town.

It is difficult to arrange a meeting since no one has time for anything but work, eat and sleep."

ROCKFORD CHAPTER

October 19—The first order of business was the annual election of the officers and was as follows: *President,* Leslie Sturch; *Vice-President,* Roy Shipman; *Second Vice-President;* Ward Minors; *Secretary,* Ed. Reynolds; *Treasurer,* C. W. Carlson; *Board of Directors,* Henry Genin, Chas. Henley, and Raymond Kruse; *Sergeant of Arms,* Harry Lindquist.

During the discussions that followed, it was decided that each member would be requested to register his attendance at a meeting, and if he missed six meetings in a row, his membership would be void. As an attendance stimulant a new method of drawing was voted on. This method is to be known as the Five by Five. At each meeting a separate drawing will be held with the

prize to be $5, furnished by the chapter. In order to win, the man whose name is drawn must have attended five previous meetings and must be a paid-up member in good standing.

November 2—The Membership Committee was appointed at this time consisting of Messrs. Henley, Wardecker and Cassity. Past President McCarthy was appointed to the state board.

A buffet luncheon was the feature of this meeting and was well attended.

November 16—The meeting was devoted entirely to business and to the collection of annual dues.

TWIN CITIES CHAPTER

November 3—The meeting was called to order by President Palen and one of the first orders of business was the report of the membership committee and the reading of new applications for membership. George Klahn was appointed to serve on the attendance committee instead of Frank Pond.

Mr. Randall asked that the chapter make some attempt to get detailed information on various makes of units sold under brand names. President Palen notified the chapter of the forthcoming election of officers which would be held at the next meeting. Some discussion was had on the method of carrying on the election.

In discussing the possibility of financial aid to the Ladies Auxiliary, the chapter voted to contribute $25 to be expended by them as they see fit.

The kitty was won by Mr. Wm. Handschug.

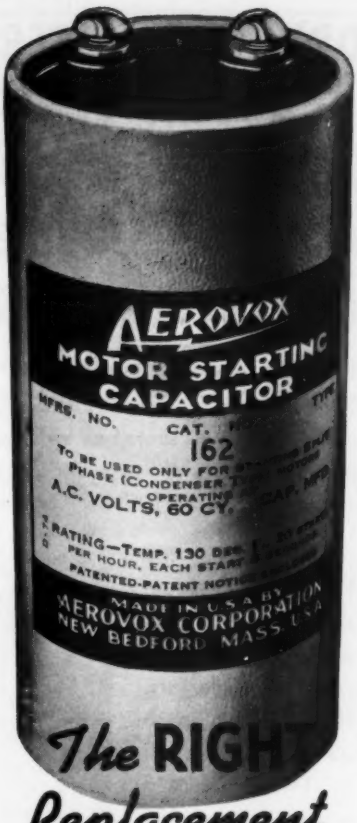
KANSAS CITY CHAPTER

October 13—The meeting was called to order by F. C. Smith, at the home of T. I. Anderson. Business matters of the chapter occupied the greater part of the evening, while on the educational program C. R. Visger discussed Kelvinators. His talk proved most interesting and very informative, and his answers to the many questions put to him provided much additional information.

After the meeting the men joined the Ladies Auxiliary for refreshments.

October 27—The meeting was held in the home of E. I. Tramposh, Secretary's correspondence included a letter from Sgt. H. T. McDermott, expressing his appreciation of mail received by him in San Francisco.

On the educational program a discussion was held on Priorities and several new points of interest were brought up.



The RIGHT
Replacement

- **Handy Aerovox listings of both the exact-duplicate and the so-called universal types, facilitate the selection of the RIGHT capacitor for any standard capacitor-start refrigerator motor.**
- **And your local Aerovox jobber stocks both exact-duplicate and universal types, for your convenience. • Ask him for latest catalog. Or write us direct.**

AEROVOX CORPORATION
NEW BEDFORD, MASS., U. S. A.
In Canada: AEROVOX CANADA LTD., Hamilton, Ont.
EXPORT: 100 Varick St., N. Y., Cable 'ARLAB'

DRINKING WATER COOLERS FOR ARMY, NAVY AND MARITIME SERVICE and WAR INDUSTRIES

This new series of "Day & Night" Self-contained Drinking Water Coolers, available in November, includes a complete line of types and sizes complying with WPB Order Chapter I—L126.

These new models conform to the Government Program to conserve materials. They replace up to 35 different models previously specified and used by various Purchasing Agencies.

DRINKING FOUNTAINS

Type	Size	Fixtures	Day & Night Model No.
B	5	1 Bubbler	UAPP5-1
B	10	1 Bubbler	UAPP10-1

BOTTLE WATER COOLER

C	2	1 push Faucet	UAB2-1

CAFETERIA GLASS FILLER COOLERS

D	10	2 Glass Fillers	*R10-2
D	25	2 Glass Fillers	*R25-2

*Condensing units installed in field. All other models sold complete.

DAY AND NIGHT COOLER DIVISION
DAY & NIGHT MFG. CO.
MONROVIA, CALIFORNIA

MILE HIGH CHAPTER

November 9—H. R. McCombs presided over the meeting. One of the early discussions of the meeting was on gasoline rationing. While no definite information was abtainable at the moment most members were of the opinion that they would be allowed enough gasoline to carry on their work.

At this time Mr. McCombs asked the members their opinion on the minimum requirements for refrigeration parts and supplies for the year 1943. He stated that jobbers had been asked to submit estimates to the Jobbers Association, and that the service groups were being asked to give their individual requirements. It is hoped that through this means that the W.P.B. will allow enough material to the manufacturers to make necessary parts available for maintenance of existing refrigeration equipment.

Among the activities of the chapter recently is the issuance of a bulletin once a month preceding the regular meeting and in it the chapter will endeavor to keep its members informed on war production orders, news items of the industry and various other matters of interest to the organization. Bulletin No. 1 was issued November 5.

KANSAS CITY AUXILIARY

October 27—Mr. and Mrs. E. L. Tramposh were hosts for the evening with Mrs. DeWilde, President, calling the meeting to order. The first part of the meeting was devoted to business during which bills were passed for payment, and amounts were drawn from the treasury for the payment of greeting cards and sympathy cards sent to members.

Christmas charity plans were throughly discussed with some arrangements made, and the balance of the evening was spent in fancy work by the members.

Coffee and doughnuts were served to the men by the ladies.

October 13—The meeting was held in the home of Mr. and Mrs. T. L. Anderson. Business occupied most of the evening with refreshments being served to both men and ladies at its close.

NIAGARA FRONTIER AUXILIARY

October 21—The meeting was held in the home of Mrs. John Muller. The first fall meeting of the auxiliary enjoyed a good attendance. As a means of occupying their time profitably in the future Evelyn McCormick was appointed to investigate the possibilities of doing Red Cross work. A

IMMEDIATE DELIVERY
on Methyl Chloride

Ample supplies of Methyl Chloride are at present available for the charging and servicing of installations which may be constructed or serviced under existing War Production Board regulations. We expect to be able to fill the approved requirements of the refrigeration industry so far as material is concerned. It is suggested that you do not stock up unnecessarily. Empty and return all cylinders promptly. Electrochemicals Dept., E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

DU PONT
REG. U.S. PAT. OFF.

METHYL CHLORIDE

Better Things for Better Living . . . Through Chemistry

blanket knitted by the ladies recently was sent to a Red Cross Unit overseas.

November 13—Mrs. John Bush was the hostess for the evening with all but one of the auxiliary's members present. The entire evening was spent in business matters of the chapter.

S S S

PRICE ADJUSTMENTS APPLY TO ALL DEALERS

SELLERS of services who base their ceiling prices on the prices of competitors are allowed to take advantage of any adjustments granted competitors, the Office of Price Administration announced November 18.

The services regulation (Maximum Price Regulation No. 165 as amended) applies to a wide range of services, such as those performed by laundries, garages, and radio repair shops. It states that when a seller of services cannot determine his maximum price under other provisions of the regulation, his ceiling shall be the highest price charged in March 1942 by the most closely competitive seller of the same class for the same service or similar service most nearly like it.

Amendment No. 8 to the regulation, effective November 18, changes that provision to read "the *maximum* price of the most closely competitive seller of the same class."

The provision in the original regulation, OPA pointed out, was based on the assumption that the competitor's highest price charged in March is always his maximum price. This is not true when a seller has been granted a price adjustment by OPA.

The amendment of November 13 makes sure that a seller whose price for a service is determined with reference to the price of a competitor will be allowed to charge the same price as the competitor.

S S S

COPPER INVENTORY IN NEW YORK

WAR producers are urged to use the facilities of the Copper Recovery Corp., 200 Madison Ave., New York, N. Y., in filling emergency shortages of copper in various forms. A national inventory of all copper products reported in idle and excessive inventories is maintained there.

"We Are Doing Many Things Without Anything"

—PRESIDENT E. A. PLESSKOTT

Refrigeration Service Engineers Society, in address at All Industry Conference on Refrigeration, November 20, 1942, Palmer House, Chicago.

This apt phrase well describes war time work methods which you service men of the nation are forced to use in repair and maintenance.

But Earnie, when you used this sparkling epigram, we are certain you did not mean to include

HERVEEN

THE REPLACEMENT GAS for METER-MISERS

For **Meter-Miser** servicing that needs gas be sure to have **HERVEEN** on hand. Most jobbers carry this replacement gas in stock, but if your supply source does not, write direct to

MODERN GAS CO., Inc.

Manufacturers and Refiners

1084 Bedford Ave., Brooklyn, N. Y.

POST CARD ADVERTISEMENT BUILDS WINTER BUSINESS

A PENNY post card on the subject of having service work done in the wintertime, sent out by a California service concern last year, was quite successful in promoting winter business. The text of the

"A YEAR FROM NOW WHAT WILL WE WISH WE HAD DONE TODAY?"

—Donald Nelson

The ranks of the refrigeration service men have been reduced so as to aid in our armed effort. We who remain must shoulder the responsibility of maintaining existing equipment for the duration. You who own or operate this equipment can help by having your work taken care of NOW, BEFORE the summer rush and resulting delays.

Lack of refrigeration means spoiled food; waste; possible illness; loss of vital man hours.

A MONTH from now what will YOU wish you had done today?

We ask your co-operation. . . . Call us today.

Name.....

Address.....

Phone Number.....

card is reproduced above. With changes for different localities, it might well be used by other service operators in the same manner.

* * *

SHORTAGE OF SERVICE MEN

"WE have a very serious situation to report in Wichita, Kansas, at the present time," writes C. F. Moore, manager of CFM Refrigeration Service in that city, "Due to the fact that this is a war production city we have lost many of our good refrigeration men to the factories, while some have gone into military service. Our city has a population of between 190,000 and 205,000, and for this population we have less than a dozen well-trained commercial refrigeration men left to do the job on air conditioning and refrigeration service.

"Last summer our men averaged from twelve to sixteen hours daily trying to keep our customers in refrigeration. Right now we have people waiting two or three days or longer for their turn in getting refrigeration service. If we must ask them to wait that long for service now, what will our city do next summer?"

Three books

you should have . . . . . .

● Every service man, refrigeration engineer or salesman should have these 3 books in his library. Inexpensive and entirely practical they'll help you to earn more by "learnin'" you more.

COMMERCIAL REFRIGERATION and COMFORT COOLING

by S. C. MONCHER

Here is a book that shows you in an easy-to-understand way How to Calculate Refrigeration Loads. The author through his wide experience in the refrigeration field is thoroughly familiar with the problems encountered in the field by refrigeration service and installation engineers, refrigeration equipment salesmen, architects, and others with a general knowledge of the field who are interested in gaining a more thorough understanding of the commercial refrigeration and comfort cooling industries as they exist today.

Price..... **$1.50**

REFRIGERATION FUNDAMENTALS

by GEO. HOLMAN

Here's an unusual book that makes the Theory of refrigeration easy to understand. The author is first of all a practical engineer. This book is the text he would have liked to have had when he first started the study of refrigeration, but nothing like it has been available until now. Unlike most authors of books on technical subjects, Holman has an interesting and logical style in expressing his thought. Even if you are already an expert engineer you will enjoy reading his unorthodox explanations, and he will undoubtedly give you a new slant on the subject. If you are just starting the study of the fascinating and complex subject of refrigeration, Holman's unusual book will give you a clearer picture of what you are going to learn.

Price..... **$2.00**

Broaden your understanding of Refrigeration, by learning more about HEAT . . .

In writing this book it has been the aim of the author, Dr. S. R. Cook, to produce a book on heat and its relation to refrigeration and air conditioning, which would be instructive to anyone interested in this field, and at the same time readily readable. The purpose is to give information essential to solution of problems that may arise in the operation of refrigeration and air conditioning machinery or for the student in his study of the science. A portion of the book is given over to definitions of terms used in heat and refrigeration and air conditioning, and to tables of heat constants which will be found very useful.

Price..... **$2.00**

● Above prices are all postpaid. Save yourself some money, all 3 above books $4.50, any two above books $3.00, when ordered at the same time, remittance must accompany order.

Nickerson & Collins Company, *Publishers*

435 N. Waller Avenue

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WATER REGULATORS
Pressure-actuated, renewable seat, ⅜", ½", ¾" pipe fittings.

SHUT-OFF VALVES
Semi-steel, carbon-steel, double-seated stem, Angle and Globe type.

ALL STEEL GAUGE SETS
Safety ball seats shut off liquid in case of glass breakage.

DEHYDRATORS
Furnished filled with Calcium Chloride, Activated Alumina, or Drierite and Silica Gel.

STRAINERS
Cylinder and Cone types, and liquid line scale trap.

ALL-STEEL LINE VALVES
Compact in design, completely rustproof, Angle, Tee and Globe types.

CYRUS SHANK COMPANY
625 West Jackson Blvd. Chicago, Illinois

GOVERNMENT SUES VIOLATORS OF PRICE CEILINGS

INDICATIONS of a tendency on the part of the Government to enforce price ceiling regulations are shown in recent news items regarding suits brought against dealers who had violated these regulations.

In St. Paul, Minn., an indictment charged Emmett Samson, proprietor of the Good Housekeeping Shop, 140 N. Concord St., with violation of price ceiling regulations in the sale of refrigerators. The indictment charges that Samson sold 31 used refrigerators at prices above ceilings set under the Emergency Price Control Act of 1942. The bill charges that the total of ceiling prices for which the refrigerators should have been sold was $2,373 whereas he actually charged a total of $4,598. One count was based on sale of a refrigerator to Mrs. Clara Frederickson, who, after consulting the Office of Price Administration on the sale, brought suit against Samson for the amount he allegedly overcharged her, plus double punitive damage. That case was settled out of court.

At Rochester, N. Y., payment of $483.50 by a secondhand dealer to a customer who sued for three times the amount he was allegedly overcharged for a secondhand refrigerator was ordered by Judge Wm. C. Kohlmetz. Benjamin Levine, operator of the store, was ordered to pay the amount to Rev. Joseph M. Harte, rector of St. George's Episcopal Church for the alleged overcharge of $113 on a used refrigerator.

At Fresno, Calif., charges have been prepared for filing in the United States District Court against three Fresno furniture stores accused of violating ceiling price regulations on new and used refrigerators, it was announced by Fred H. Kurz, district manager of the OPA. Each is accused of selling merchandise at prices higher than the OPA ceiling. The excessive prices charged amounted to several thousand dollars and the concerns have made voluntary contributions to the Government in the amount of the overcharges, according to W. D. Cannon, attorney for the OPA. Mr. Cannon said they will be charged with failing to keep proper records of their sales and failing to post ceiling-price notices.

GREASE RESISTANT AND ODORLESS
JARROW REPLACEMENT **DOOR GASKETS**
• Long life, resilient and conform to original specifications.
RECOMMENDED BY LEADING JOBBERS
JARROW PRODUCTS
420 North La Salle St. Chicago, Ill.

DEHYDRATORS

DEHYDRATORS — all types — REBUILT LIKE NEW. NEW FELTS and NEW STRAINERS installed. REFILLED WITH SILICA GEL.
Send us your shell and get back a factory rebuilt dehydrator that will do the job.
Price: $1.00 for 1 TON DEHYDRATOR —F.O.B. New York
(Special Discount On Quantity)
All fittings must accompany order.
N. Y. CONTROL CO.
534 Courtland Ave., New York City

REFRIGERATION HAS COME A LONG WAY

William Hampson—England—1854-1926
Author of "Radium Explained"
"Paradoxes of Nature and Science"

1895

The Hampson-Linde Process was the first successful method of inexpensive commercial production of liquefied gas. Linde's invention of 1895 was greatly simplified a year later by the Englishman Hampson and their combined apparatus still is used in university and research institutions.

1942 From these painstaking and vital accomplishments of the pioneers of the Refrigerating Industry, we today gain inspiration and skill for the task before us. Ours is the twofold task — that of safeguarding the perishable foods of a nation at war — and that of conserving the foodstuffs that will be perhaps our country's greatest contribution to the world after the peace.

BUY WAR BONDS & STAMPS

"VIRGINIA" REFRIGERANTS
AGENTS FOR KINETIC'S "FREON-12"
VIRGINIA SMELTING CO.
WEST NORFOLK, VIRGINIA

V VIRGINIA

PURCHASER OF ELECTRIC MOTOR MUST SPECIFY NEEDS

A PURCHASER of an electric motor must show that the horsepower of the motor he is applying for is no greater than that required to do the job, according to a provision in General Conservation Order L-221, announced by the Director General for Operations, W.P.B.

Officials of the General Industrial Equipment Division pointed out that it has been the practice of industry for many years to "over-motor," that is, to apply greater motor capacity than necessary for the job to be done. As a means of stopping this practice, the order applies certain measurements by which the actual power requirements may be related to the horse power of the motor applied for by the purchaser.

L-221 prohibits the delivery or acceptance of motors, unless they comply with certain standard specifications and are of the simplest practicable, mechanical and electrical design. It also requires the purchaser to certify and show reason why he must have a motor of a special type; and it restricts the use of such special types to the conditions and the purposes for which they are required. For example, it limits the use of explosive proof motors to hazardous locations.

One of the important conservation provisions in the order applies to both motors and generators. It requires the applicant to certify that he has made every reasonable effort (1) to adapt idle motors or generators in his possession, (2) to obtain used ones for his purpose, and (3) to repair or recondition his existing equipment.

Where used equipment cannot be secured within a reasonable time by the applicant, it is suggested that he make his needs known to W.P.B.'s Surplus Used Equipment Branch, which will assist him in meeting them.

It is estimated that the conservation and simplification provisions in the order will save in one year about 15,000,000 pounds of copper, 55,000 tons of carbon steel and 150,000 pounds of stainless steel.

The order became effective December 10, 1942.

HIGHSIDE CHEMICALS CO.
195 Verona Ave. Newark, N. J.

Season's Greetings

At this time, when we look back at 1942, we find that, *business-wise,* we are indebted to both the Army and Navy and to many refrigeration service engineers, jobbers, manufacturers, ice cream and dairy companies, and others who have used our product to protect countless refrigeration units. They have made this our greatest sales year.

But, far more important than sales, just now, is the protection provided by these *same service agencies,* civilian and military, in assuring to present and future generations the continuance of the American way of life. . . . and that is paramount!

THAWZONE
Fully Protected by U. S. Patents
The **PIONEER FLUID DEHYDRANT**

GOVERNMENT WILL ALLOW FULL COST OF INSTALLATION

OWNERS of large-scale refrigerators and air-conditioning equipment who sell this machinery for use by war industries will be paid the total cost, less depreciation, but including the full cost of original installation, the Office of Price Administration has announced.

The War Production Board is urging department stores, hotels, office buildings and other enterprises to sell such equipment, since new production cannot meet all the needs of war industries. Since the sellers of this equipment would be patriotically sacrificing its use for the duration of the war, OPA ruled that they should be fully reimbursed.

This action, contained in Amendment No. 55 to Maximum Price Regulation No. 136 (Machines and Parts and Machinery Services), provides that the maximum price for these sales shall be the installation costs of the equipment to the user plus the original cost less depreciation at the rate of five per cent per year. This is the generally accepted depreciation rate recognized by the United States Treasury in its purchases.

The conversion program calls for the purchase of this machinery by its manufacturers, who will then recondition it for the use of the plant to which WPB has allocated it. The OPA action, which became effective November 27, 1942, permits the manufacturer to recover his total expenses, including inspection, dismantling, rebuilding and reconditioning, shipping and installation costs. In addition the manufacturers may add any out-of-pocket expenses incurred in such transactions, plus a reasonable charge for engineering and risk and responsibility.

Manufacturers' charges for risk and responsibility and for engineering will be reviewed by OPA, as all manufacturers are required to submit a report of the transaction and the amount of profit to OPA. Unless OPA disapproves the transaction within 30 days, the price at which it is sold by the manufacturer will be considered to be automatically approved.

BRUNNER MANUFACTURING COMPANY RECEIVES ARMY-NAVY "E" BANNER AT SPECIAL PRESENTATION CEREMONIES

PRESIDENT BRUNNER, MAJOR BATTLEY AND LUCIUS PARKER, BRUNNER MFG. CO., HOLD UP "E" BANNER FOR AUDIENCE TO VIEW DURING PRESENTATION CEREMONIES HELD NOVEMBER 7.

Major Halsom R. Battley, U. S. Army Air Corps, made the formal presentation of the Army-Navy "E" flag to George L. Brunner, president of the Brunner Mfg. Co., Utica, N. Y. Guests of honor, besides the principal speakers, included George L. Brunner, Jr., vice-president and secretary of the company; William S. Risinger, president of the school of Commerce and Master of Ceremonies for the occasion; Mayor Vincent R. Corrou; James G. Capps, president of the Utica Chamber of Commerce; and F. M. Womeldorf, Chief of Inspectors, U. S. Engineers.

The Award Ceremony, witnessed by 1,000 Brunner employees and citizens of Utica, saw the conferment of the coveted "E" banner for unusual achievement in the production of vital war material.

HERMETIC REBUILDING

One of the largest hermetic rebuilding plants in the United States. Refrigeration units, parts and supplies. General Electric, Westinghouse, Grunow, Majestic, Crosley, Frigidaire, Norge, Kelvinator, and others. Write for catalog on your letterhead.

WANTED AT ONCE!

SHOP MEN IN ALL BRANCHES OF REFRIGERATION

Write Us Giving Full Experience

Service Parts Company **2511 Lake St. Melrose Park, Ill.**

YANTIS JOINS WOLVERINE

Roy C. Yantis has joined the Development Engineering Staff of the Wolverine Tube Division of Calumet and Hecla Consolidated Copper Company, Detroit, effective November 9. He will serve as a mechanical engineer.

ROY C. YANTIS

A graduate of the Industrial Engineering College at Ohio State University, Mr. Yantis comes to Wolverine from the Gibson Refrigerator Company. Prior to this affiliation, his engineering experience also includes work at two divisions of General Motors, the Inland Division and Frigidaire Division, both at Dayton.

BIND—Your Copies of *The Refrigeration Service Engineer* for Future Reference

All Copies Are Punched to Fit Binder

Every issue of this magazine will have valuable information which you will want to retain for future reference.

Holds twelve issues—an entire year's supply. No hunting around for lost or missing issues. The entire year's edition is always handy.

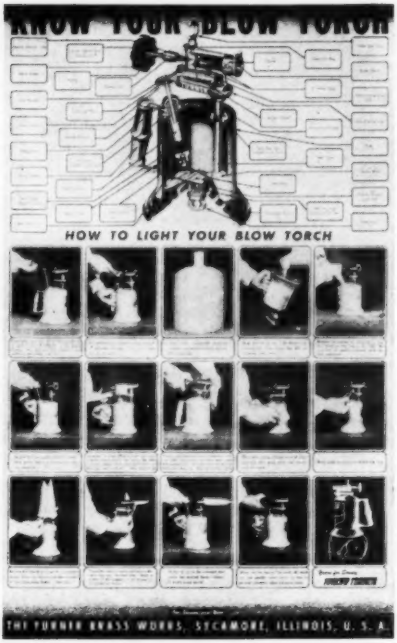
The name of the magazine is attractively stamped on the cover in gold.

HOLDS TWELVE COPIES
Only $1.50 Postpaid

THE REFRIGERATION SERVICE ENGINEER
433 NORTH WALLER AVE.
CHICAGO, ILL.

WALL CHART SHOWS HOW TO OPERATE A BLOW TORCH

FROM the war industries and defense training schools come appeals for service and maintenance information on tools being used in war work. In answer to these appeals, The Turner Brass Works has produced a very attractive two-color wall chart, entitled "Know Your Blow Torch."

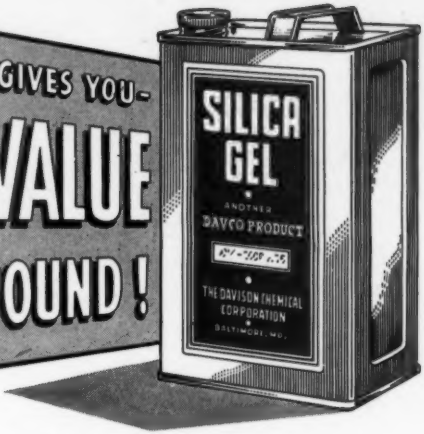


Wall Chart on Blow Torch Produced by Turner Brass Works.

This chart, reproduced above, shows how all parts of a blow torch are labeled, and how lighting instructions and safety hints are shown in action pictures. This chart is furnished free of charge to industries and schools. The only restriction is that the request be made by a responsible party to assure its being put to a good use.

ONLY DAVISON'S GIVES YOU-

EXTRA VALUE IN EVERY POUND!



More refrigerators to service and the scarcity of replacement parts are two reasons why your selection of the most *dependable* drying agent is so important these days. You must KNOW—and be able to assure your customers—that you have permanently eliminated moisture—the major source of refrigeration breakdowns; that the equipment will operate more efficiently and last longer.

Standardize on *Davison's* Silica Gel—the drying agent that outperforms them all—in capacity, speed and clean-up. You will save time on every job, give better service to more customers. These are the added advantages that you soon will recognize.

Your jobber can supply you with Davison's Silica Gel in bulk for refill and in charged dehydrators.

DAVISON'S
ASSURES THESE ADVANTAGES:
GREATER CAPACITY
(1½ to 2 times as much capacity as other drying agents)
ACTS INSTANTLY
REMOVES ACIDS
DOES NOT CAKE NOR POWDER

ALWAYS SAY *"Davison's"*

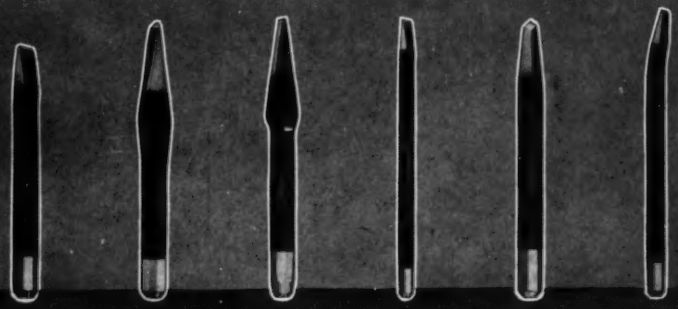
SILICA GEL

"MOISTURE'S MASTER"

THE DAVISON CHEMICAL CORPORATION
Silica Gel Department
BALTIMORE • MARYLAND

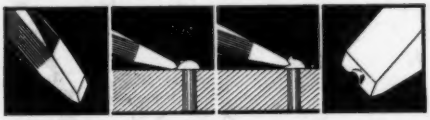
The Finest that Money Can Buy

Here's how to make your BONNEY Chisels last for the Duration



NO tools take more abuse than chisels. Because tools of all kinds are scarce and hard to replace due to war requirements, it's necessary for you to take the best possible care of your Bonney Chisels. Whenever you've got a job to do requiring a chisel, make sure you've got the *right* chisel to do the job. The *right size* as well as the *right type*. It's easier, it's quicker, it's cheaper . . . *it's smart*.

Don't for example, use a flat chisel for cutting off a rivet or bolt head. Here's what happens when you do.



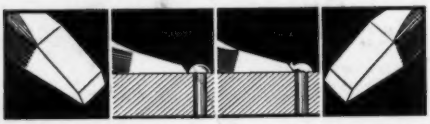
The wrong type to use for cutting bolt or rivet heads. Note shape of cutting edge.

Impossible to get under bolt or rivet head with flat chisel.

Chisel cannot take head off cleanly . . . damages cutting edge.

Result of using wrong chisel. Cutting edge badly damaged.

And here's what happens when you use a rivet buster . . . the *right* tool for the job.



Right type (rivet buster) to use when cutting bolt or rivet heads.

Flat side (cutting edge) placed flush with bolt or rivet head.

A few taps. Head is removed. Chisel not damaged.

Result of using right chisel. Cutting edge not damaged.

Bonney Chisels are drop forged of selected alloy steel . . . of steel selected especially for the work they must do . . . and carefully heat treated. Their bits are hard and tough enough to be used on any untempered material. Sure, they'll become battered, but they are sufficiently soft so that they can be redressed and resharpened with a file.

Made in 6 types . . . 15 sizes . . . a chisel for practically every job . . . by tool craftsmen with pride in their ability to make fine tools. Every Bonney Chisel is designed for a particular application. Make sure you use the *right size* as well as the *right type*.

Sure we want to sell Bonney Chisels . . . want to sell all the Bonney Tools we can make . . . but we want to help you get the most you can out of those you have now. *Be smart* . . . take care of your Bonney Tools. They will last for the duration if you do. We don't want you disappointed because of your inability to get all of them you want. Bonney Forge & Tool Works, Allentown, Pa.

Awarded to the Men and Women of Bonney Forge & Tool Works "for greater accomplishment in the production of war equipment".